JULY 19, 1945

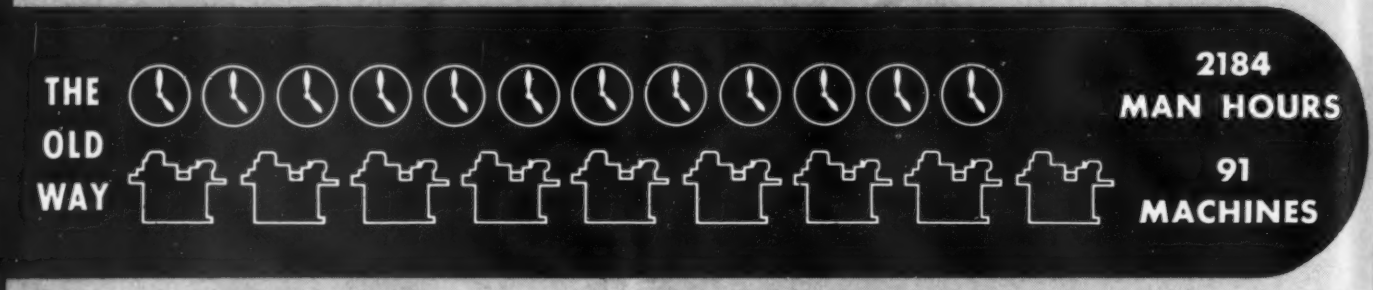
American Machinist

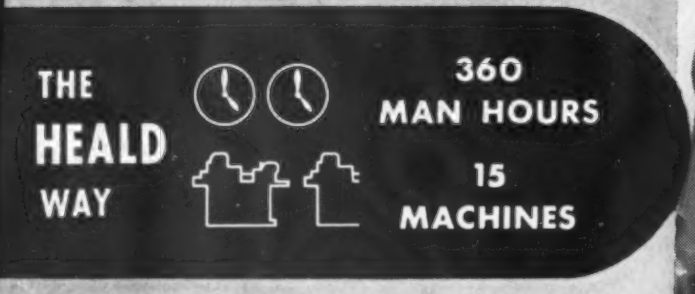
TECH LOGY DEPT
PUBLIC LIBRARY
JUL 18 1945
DETROIT

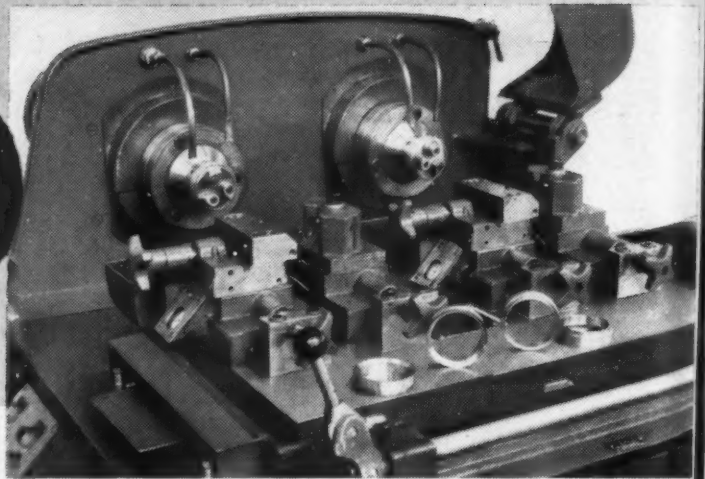
Oxyacetylene Cutting

STARTING A NEW SERIES ON METHODS AND EQUIPMENT

FINISHING 6 TIMES FASTER WITH BORE-MATICS







HEALD BORE-MATIC 4/A in an automatic cycle, turns, chamfers, straddle faces valve seat inserts two at a time. *A good example of Precisioneering*

Valve Seat Production Maintained with 15 Bore-Matics—91 Machines Released for Other Work

This tremendous saving—83½% reduction in manhours and equipment for machining valve seat inserts—was effected solely thru installation of Heald Bore-Matics. Operations required to finish inserts on O.D. and sides were cut from 3 to 1... number of machines from 91 to 15...manhours from 2184 to 360 per 24-hour day.

Besides these substantial economies in costs and time, valuable floor space also was saved and vital machines released for other work.

Here's only one example of HEALD PRECISIONEERING at work. If you plan to jump the gun on postwar competition, now's the time to scrutinize operations in your own plant. Chances are that worthwhile savings can be obtained by borizing on Bore-Matics. Let us analyze your problem. We'll be glad to work with you.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASS.

HEALD...*first with the finest*

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

American Machinist

July 19, 1945

BURNHAM FINNEY — Editor and Publisher
W. E. KENNEDY — General Manager
JOHN HAYDOCK — Executive Editor

•

WILLIAM J. HARGEST — Associate Editor
RUPERT LE GRAND — Associate Editor
BEN C. BROSHEER — Associate Editor
A. J. HOLLAND — Associate Editor
HARRY J. WILLIAMS — Associate Editor
BENJAMIN W. CORRADO — News Editor
WILLIAM R. NELSON — Pacific Coast Editor
CHESTER S. RICKER — Detroit Editor
SYDNEY OXBERRY — Assistant Editor
R. M. BENNETT — Assistant Editor

On Leave With Armed Forces
ANDERSON ASHBURN — Assistant Editor

•

PAUL WOOTON — Chief, Washington Bureau
KENNETH H. CONDIT — Consulting Editor
FRED H. COLVIN — Editor Emeritus

District Managers: F. S. Weatherby, Boston; J. A. McGraw, New York; R. M. Thierer, New York; D. G. Jones, Philadelphia; Ray Deen, Chicago; P. F. Pritchard, Chicago; C. E. Beavan, Cleveland; R. H. Anderson, Cincinnati; T. A. Rogers, Detroit.

McGraw-Hill Publishing Company, Inc.

James H. McGraw, Founder and Honorary Chairman; James H. McGraw, Jr., President; Curtis W. McGraw, Senior Vice-President and Treasurer; Howard Ehrlich, Vice-President (for business operations); John Abbink, Vice-President (for editorial operations); Joseph A. Gerardi, Secretary, and J. S. Blackburn, Jr., Director of Circulation, 330 West 42nd Street, New York 18, N. Y. Branch Offices: Chicago, 520 North Michigan Ave.; San Francisco, 68 Post Street; Los Angeles, 621 So. Hope Street; Pittsburgh, 738-9 Oliver Bldg.; Aldwych House, Aldwych, London, W. C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta.

RETURN POSTAGE GUARANTEED

VOLUME 89 NUMBER 15

AMERICAN MACHINIST. Copyright 1945 by McGraw-Hill Publishing Co., Inc. Published every other Thursday, price 35c a copy. Allow ten days for change of address. Subscription rates—United States, Mexico and Central and South American countries, $5 a year, $8 for two years, $10 for three years. Canada, $6 a year, $10 for two years, $12 for three years. All other countries, $10 a year, $16 for two years, $20 for three years. Please indicate position and company connection on all subscription orders. Entered as second class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U. S. A. Cable address, "McGraw-Hill, New York." Member of A.B.P. Member of A.B.C.

A McGRAW-HILL PUBLICATION

MAJOR ARTICLES

Data on Oxyacetylene Cutting.....*Dr. G. V. Slottman* 99
The Army Curbs Lost Man-Hours.....*Major Edward D. White* 102
Rubber Press Department...*Edwin H. Schaeffer & Walton Hughes* 105
Clutches and Couplings Produced Rapidly.....*Ernest Wildhaber* 110
Steady Jobs and Equipment Buying.....Facing Page 112
Chemical Treatment of Aluminum.....*C. B. Gleason* 113
Short Cuts for the Small Shop.....*A. H. Waychoff* 115
Form-Tool Correction Made Easy.....*Alfred S. Gutman* 116
Sealing Points Eliminate Ring Leakage.....*Harry G. Wessel* 118
Circular Milling on a Hobbing Machine..... 121
Naval Ordnance Plant Builds 5-in. Guns..... 122
Machines Meet Varied Marking Requirements.....*H. O. Bates* 128

PRACTICAL IDEAS

Hat Section Bends Corrected.....*Grover Windall Easley* 131
Boring Bar Bits Held Without Setscrews.....*C. M. Huntley* 131
Diamond Saw Quickly Slots Prisms.....*Darnell G. Talbert* 132
Punch Press Attachment for Spacing Holes.....*A. D. Keene* 132
Shutter-Speed Rings Chucked.....*Frederick A. Fazar* 133
Flanging-Die Liner Reduces Replacement.....*Harold Monozon* 133
Counterbore Toolholder for Close Tolerance Work...*Thomas Rock* 134
Grinding Pin Ends in Fixture.....*Gerald N. Lowing* 134
Chain-Grip Pipe Vise With Toggle Tightener.....*M. L. Nielson* 134
Jig Holds Sheet Metal to Angle.....*William L. Roberts* 135
End Bushings Soldered Into Steel Shells.....*William W. Gaffney* 135
Short Lift Hydraulic Jack.....*A. W. & W. A. Beecher* 136
Helical Pipe Coils Wound on Mandrel While Heated....*F. C. Kyte* 136

NEWS OF THE INDUSTRY

Gaging Business..... 140a
Detroit Letter 140c
Washington Bulletin..... 140e
Spotting the Air News.... 140f
Names in the News..... 140g
Obituaries 140h

DEPARTMENTS

Editorial 97
Reference Book Sheet 137
Shop Equipment News..... 142
Trade Publications..... 156

CHANGE OF ADDRESS ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

★ Director of Circulation
★ AMERICAN MACHINIST, 330 West 42 Street, New York 18, N. Y.
★ Please change the address of my American Machinist subscription.
★ Name_____
★ Old Address_____
★ New Address_____
★ New Company Connection_____
★ New Title or Position_____

American Machinist Chips

In This Issue . . . Featured in this issue is the first of a 12-installment series on oxyacetylene cutting, prepared by Dr. G. V. Slottman of the Applied Engineering Department, Air Reduction Sales Company. This will serve as a series of particular interest because it will give fundamentals of flame cutting, developments, trends and many other angles in this important production process.

Other articles include one on the Army program of "Presenteeism" which has been successful in cutting down "Absenteeism"; a picture story of the construction of the 5-in. gun at a Westinghouse-operated war plant; production planning for a hydro-press department as described by Edwin H. Schaefer and Walton Hughes, engineers of the General Motors Corporation.

Designer's Dream . . . *Reading a copy of* Cuttings, *lively little magazine put out by Midwest Tool and Manufacturing Company of Detroit, we ran across a little poem we think will appeal to many shop men. With a bow of appreciation to Midwest Tool, we reproduce this little number as follows:*

The designer bent across his board,
Various things in his head were stored,
And he said as he rubbed his throbbing bean,
How can I make this hard to machine?
If this part here were only straight
I'm sure the thing would work first rate,
But 'twould be too easy to bore,
It will never make a machinist sore.
I better put in a right angle there
Then watch those babies tear their hair.
Now I'll put those holes that hold the cap
Way down where they're hard to tap.
Now this piece will do, I'll bet a buck,
For it can't be held in a shoe or chuck,
It can't be drilled, it can't be ground,
In fact the design is exceedingly sound.
He looked again and cried "At last!
Success is mine, it can't even be cast."

Reconversion Plans . . . We have at hand several copies of this year's second quarterly report from the U. S. Department of Commerce Field Service. These particular reports cover the Midwest region and the East Central region and discuss at length reconversion plans and problems in these areas.

In the Midwest, optimism over a fairly easy switch to civilian manufacture prevails generally . . . varying, of course, by type of business, product and condition of war contracts.

In the East Central area the outlook is spotty. Chief among those who are not worried about approaching problems are manufacturers of both household and industrial electrical equipment.

Wartime Developments . . . Several issues ago our editors carried a description of a book put out by the government describing many manufacturing advances made during the war.

Since then we have had numerous requests for information on how to get hold of this book. The title is "Wartime Technological Developments"—a study made for the Subcommittee on War Mobilization of the Committee on Military Affairs, U. S. Senate. Dated May 1945.

You might want to send for this, and if you do, notice the frequent quotations from *American Machinist*.

From the Mailbag . . . *"Certainly I read the ads! How else can we find the dope on the things we want and use? Just today I was looking up the address of a certain manufacturer of machine tools who, apparently, has neglected to continue in your publication. That put me through a lot of bother to locate him, since my own file wasn't on hand (I being in another man's office). But he has* American Machinist, *so there we looked but found the erstwhile advertiser not. You see what I mean?" W. B. Oaks, Wks. Mgr., Eureka Vacuum Cleaner Co., Detroit, Mich.*

Old Timer . . . A recent advertisement of the International Correspondence Schools quotes a comment made by *American Machinist* 44 years ago—when I. C. S. founded its School of Shop Practice and produced the first instruction papers on this subject. In our issue of September 5, 1901 we said, *"No such complete and systematic collection of information on the principles and practices of machine construction was ever gotten together before."*

The importance which *American Machinist* recognized at the beginning of this work has grown through the years—especially during the war era. The School of Shop Practices jumped, in number of enrollments among all I. C. S. courses, from fourth place in 1939 to first place in 1940. The course still rated third in popularity in 1943 and remains among the leaders today.

Practical Ideas . . . We have had widespread response to our reminder of a few months back that *American Machinist* editors always welcome brief stories of helpful and ingenious production ideas . . . the best of which appear each issue in the popular department "Practical Ideas."

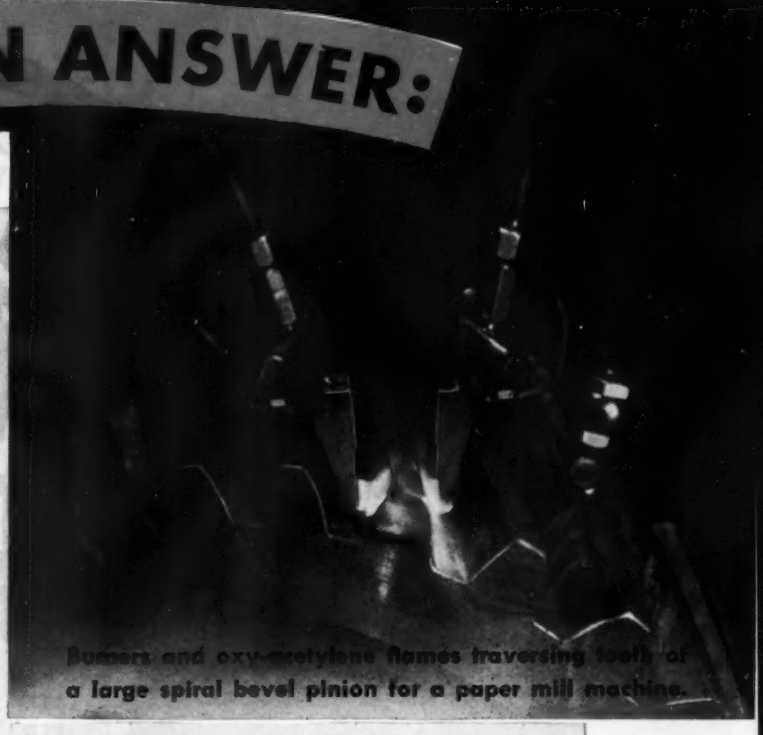
In case you have been thinking of sending in a story of your own experience, remember you will get cash for it—*paid promptly upon acceptance.* No need to wait for its publication. Send your suggestions to Practical Ideas Editor, American Machinist, 330 West 42nd St., New York 18, N. Y.

Paper Problem . . . All business papers have been asked to remind their readers that there is still a pressing need for paper and that this will probably continue until the Japs are licked. Being constantly aware of the size of our waiting lists of would-be subscribers and advertisers, we can certainly testify to the fact that the paper famine is still very much in existence.

There are three things you can do to help out: 1—Share this magazine with others. 2—Be sure that the last reader turns it in for salvage unless it is to be preserved for reference. 3—Look around in your cellar, attic and storerooms for those bundles of magazines you don't need . . . and turn them in. Everybody will benefit by your cooperation.

Why Surface Harden Gear Teeth?

THE GLEASON ANSWER:



Burners and oxy-acetylene flames traversing tooth of a large spiral bevel pinion for a paper mill machine.

1. Maximum wear resistance with minimum distortion is produced by the Gleason localized hardening method, because each tooth is hardened individually, employing an oxy-acetylene flame and an air quench.

2. Uniform hardness for each tooth is attained by automatic operation of machines used.

3. The installation and operating cost is low. There is only one machine to buy, which, by use of simple, replaceable burner tips can handle a wide range of sizes and pitches of bevel, spur, and internal gears. Also, only a small supply of oxygen and acetylene is required.

4. Thousands of gears surface hardened by the Gleason method are in daily use. These range from small, instrument-type gears to large gun mount drives.

It should be noted, of course, that the initial core strength and mountings must be adequate.

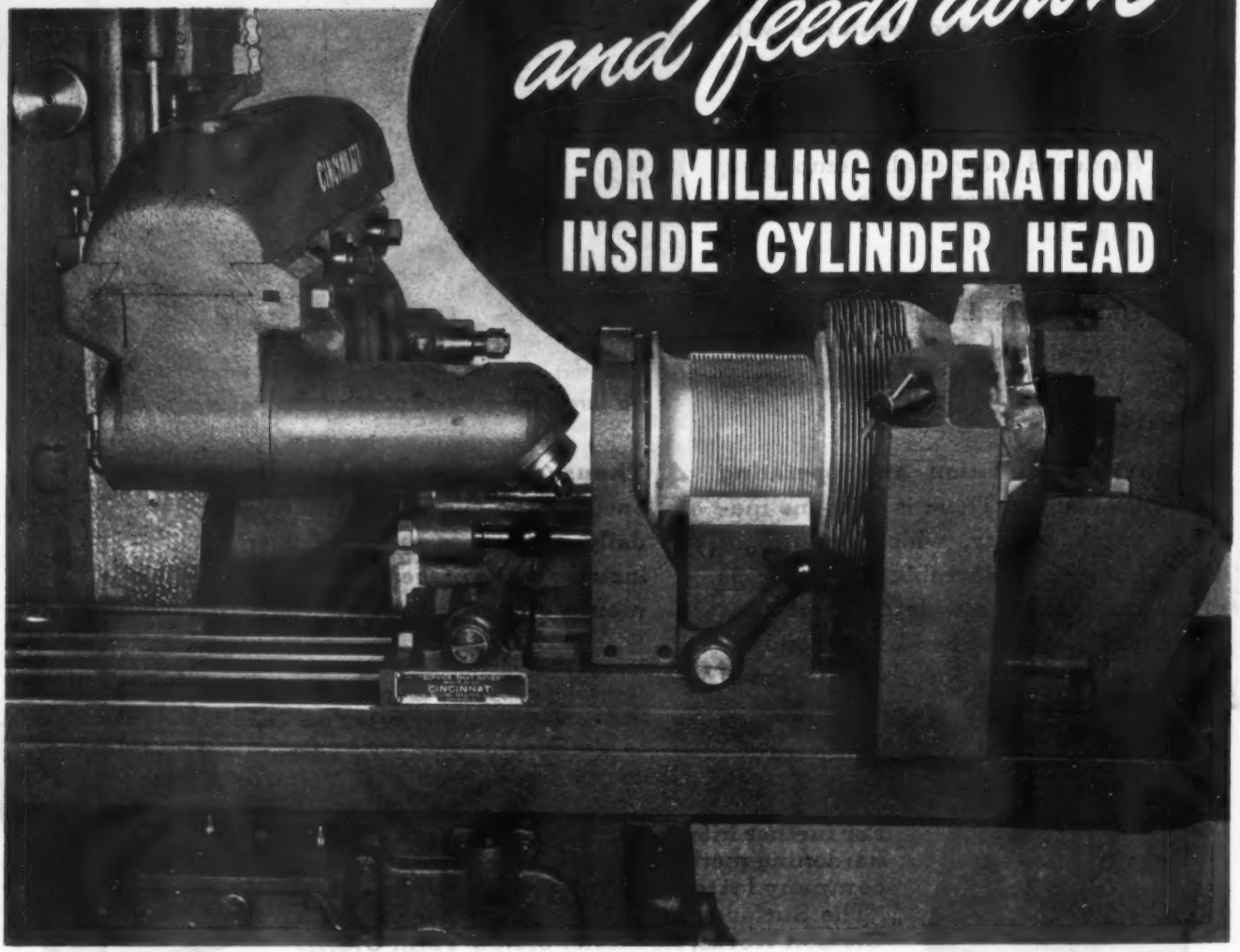
GLEASON Works
Builders of BEVEL GEAR MACHINERY FOR OVER EIGHTY YEARS

For further information on the Gleason surface hardening method and machines, write on your company letterhead for descriptive bulletin "The Surface Hardening of Gear Teeth." The Gleason Works, Rochester 3, New York, U.S.A.

Hardening a lot of large spiral bevel gears for oil well machinery on the No. 2 Gear Surface Hardener.

Reaches in and feeds down

FOR MILLING OPERATION INSIDE CYLINDER HEAD



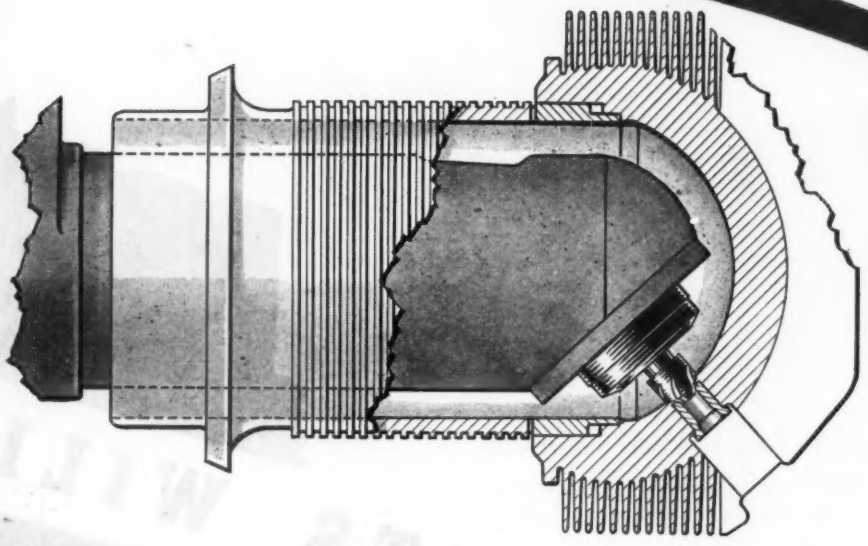
Milling the radius and chamfer on the end of the fuel injection insert *inside* the cylinder head of an aircraft engine. The machine is a standard **CINCINNATI** No. 2-24 Plain Automatic Rise and Fall Miller equipped with special internal milling head, fixture and cutter designed by Cincinnati Application Engineers.

CINCINNATI

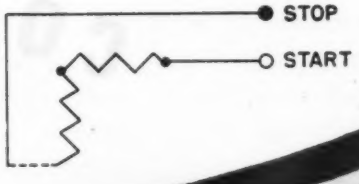
KEEP YOUR PAYROLL ALLOTMENT FOR WAR BONDS UP TO 15% OR MORE

THE CINCINNATI

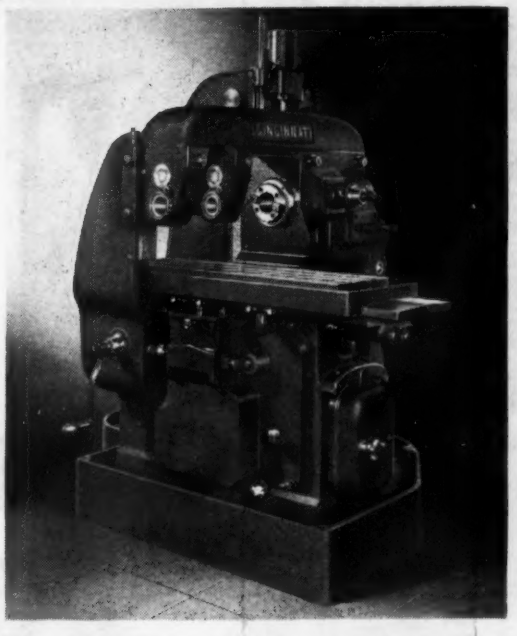
MILLING MACHINES



This cutaway view shows clearly what takes place during the milling operation on the inside of the cylinder head. Also illustrated is the automatic operating cycle.



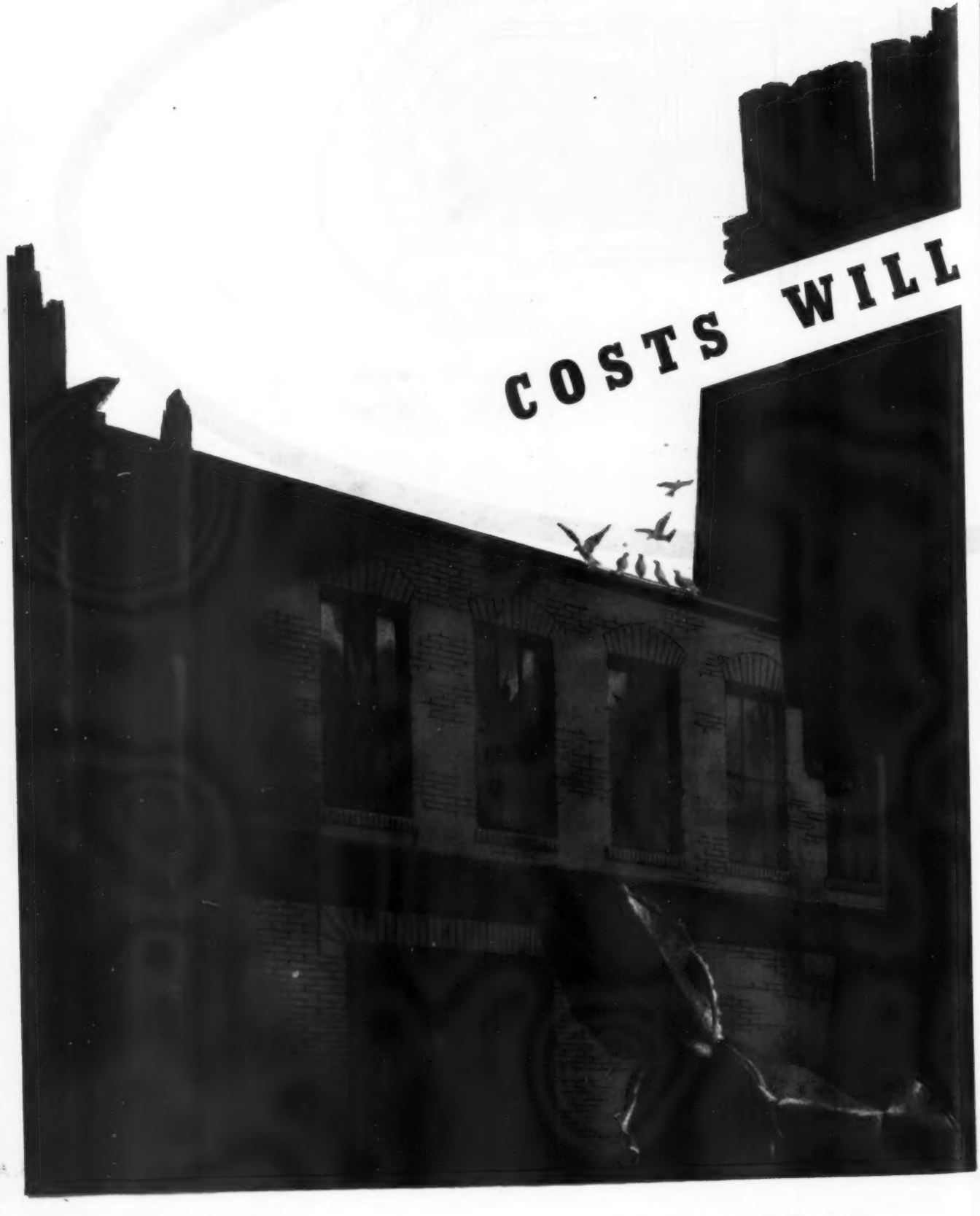
This equipment on a standard CINCINNATI No. 2-24 Plain Automatic Rise and Fall Miller made a comparatively simple milling job out of what seemed a difficult operation. The machine is equipped with special internal head to reach through the cylinder barrel to mill an insert inside the cylinder head. The entire operation is automatic . . . advance table to accurate milling position . . . mill down . . . retract spindle head . . . return table. Aside from the equipment designed for the job, one of the important reasons why the job works out so successfully is the accurate positioning of the table and the automatic down feed of the cutter . . . a feature on all CINCINNATI No. 2-24 Plain Automatic Rise and Fall Milling Machines. ¶ Perhaps Cincinnati Application Engineers can improve production and accuracy on some of your work. They will be glad to talk it over with you and give you the benefit of many years' experience in the adaptation of CINCINNATI Milling Machines to handle your unusual or difficult jobs.



CINCINNATI *No. 2-24 Plain Automatic Rise and Fall Milling Machine. Catalog 909-1 contains complete specifications. Sweet's Catalog File gives a brief description.*

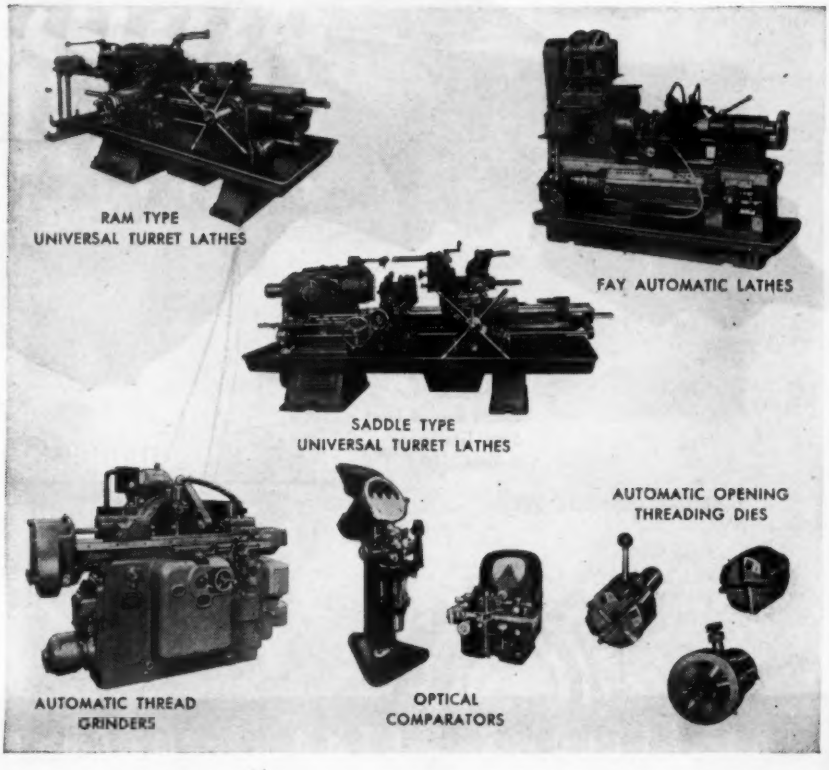
MILLING MACHINE CO. CINCINNATI 9, OHIO, U.S.A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES


COSTS WILL

MAKE THE DIFFERENCE

Manufacturers must use the most efficient machine tools available, to remain in business and maintain *full employment.* Today carbide cutting tools make possible increases of from 200 to 500 per cent in the speed of metal turning—but only when used with machines which can transmit the horsepower and have the rigidity to take full advantage of these tools. Scrap your old machines. Purchase War Surplus machines or new machines. Ask for one of our engineers to assist you in making the most profitable investment. Or, send for our book, "Welcome to You and Your Problems".

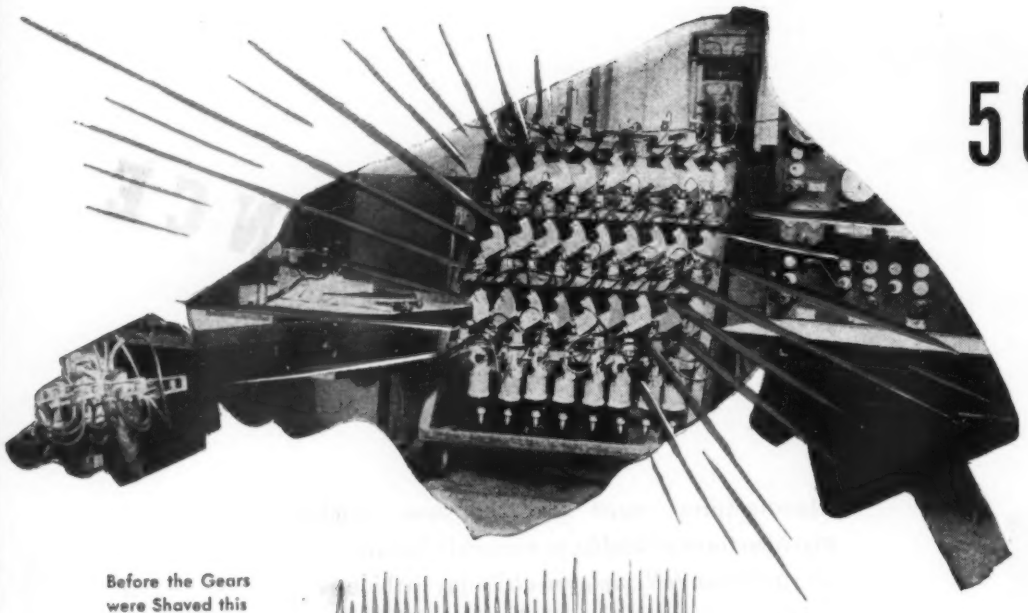


JONES & LAMSON
MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

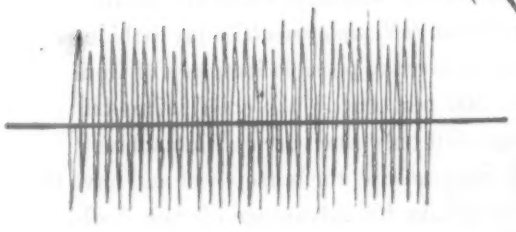
Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

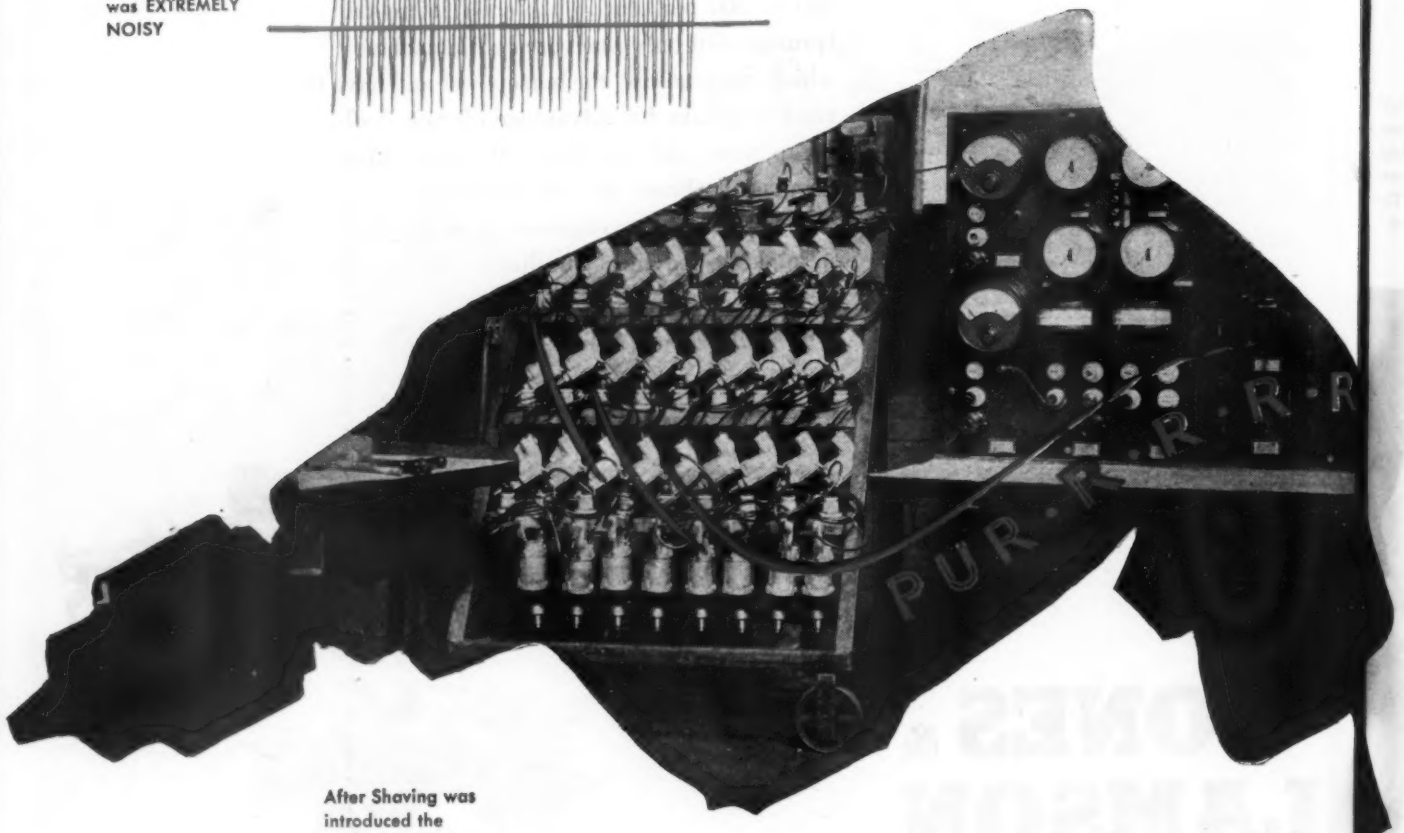
50% LESS

SINC G

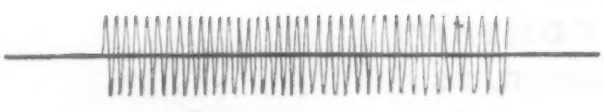


Before the Gears were Shaved this test department was EXTREMELY NOISY





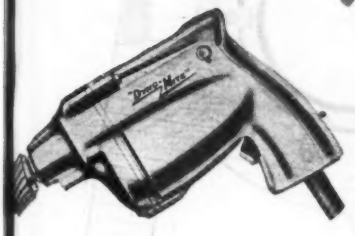
After Shaving was introduced the sound was at least 50% less in volume



THE FELLOWS METHOD...MACHINES AND TOOLS FOR AL

NOISE

GEARS ARE *Fellows Shaved*



Today, the noise in the test room of the Millers Falls Company is a far cry from what it used to be. In fact, plant engineers estimate it's 50% less.

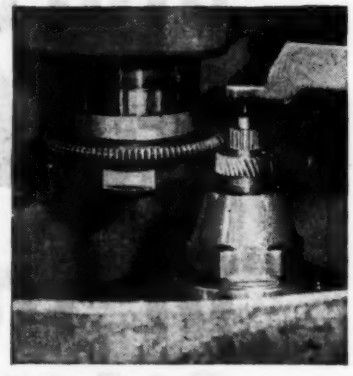
Here, humming away *smoothly*, are more portable electric tools than 'twould be easy to count, getting their final check for high operating efficiency. And one of the reasons why this testing is so much *quieter* is that the gears of these famous "Dyno-Mite" and other drills are first cut to high accuracy on a Fellows Gear Shaper — *then given ultra-fine tooth finishing on a Fellows Gear Shaving Machine.*

But *quiet* is not the only advantage.

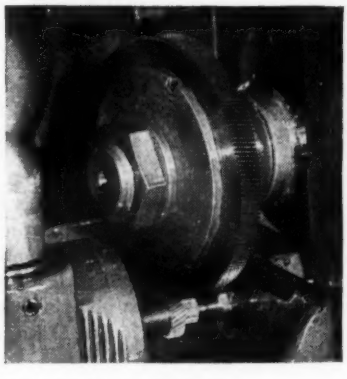
These gears will give longer service life, too. They'll contribute to more hours of peak electric tool performance... minimize the need for maintenance... and lower operating costs.

★ ★ ★

If you're faced with a gear problem, feel free to call upon us. Our engineers will gladly work with yours, and advise how the Fellows Method may best be applied to your requirements. Write the Fellows Gear Shaper Company, Springfield, Vt., or 616 Fisher Bldg., Detroit, or 640 West Town Office Bldg., Chicago.



Cut on Fellows
7A-Type Gear Shaper



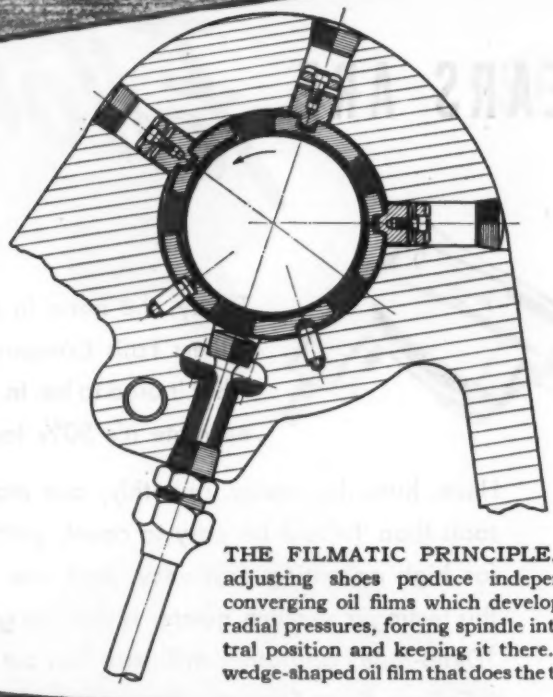
Finished on Fellows
Gear Shaving Machine

Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

FILMATIC

STOPS "PECKING OF THE DIAMOND"



THE FILMATIC PRINCIPLE. Self-adjusting shoes produce independent, converging oil films which develop high radial pressures, forcing spindle into central position and keeping it there. "The wedge-shaped oil film that does the trick."

In this illustration a CINCINNATI Plain Self-Contained Grinder is finish grinding the outside diameter of a printing press cylinder. Catalog G-491-1 contains complete specifications for this machine. Sweet's Catalog File for Mechanical Industries gives a brief description of CINCINNATI Grinding Machines.

KEEP YOUR PAYROLL ALLOTMENT FOR **WAR BONDS** UP TO **15%** OR MORE

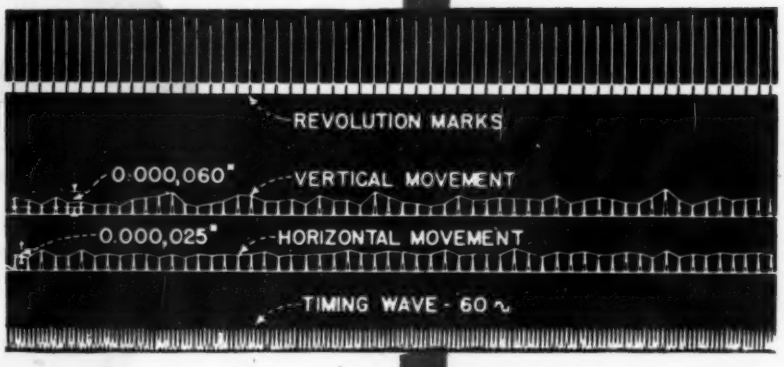
CINCINNATI G

CINC

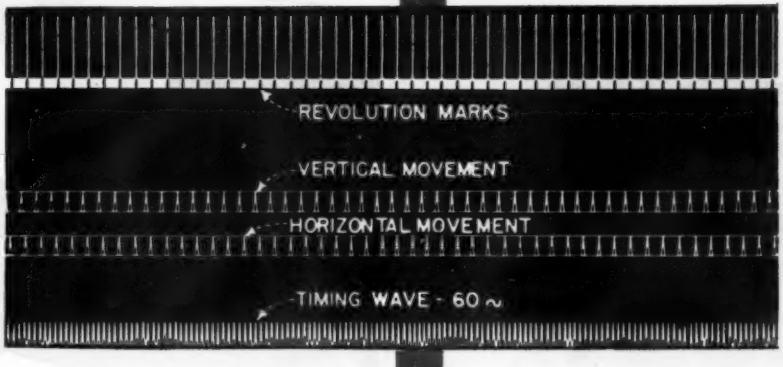
CENTER TYPE GRINDING MACHINES

CENTE

ORDINARY BEARINGS. *Tips of wave peaks indicate the spindle position once each revolution. Irregularity in position of the wave tips indicates a slight fluttering of the spindle axle.*



FILMATIC BEARINGS. *There is no discernible spindle flutter. The even alignment of the wave tips in this oscillogram indicates a true running spindle, and, therefore, no pecking of the diamond.*

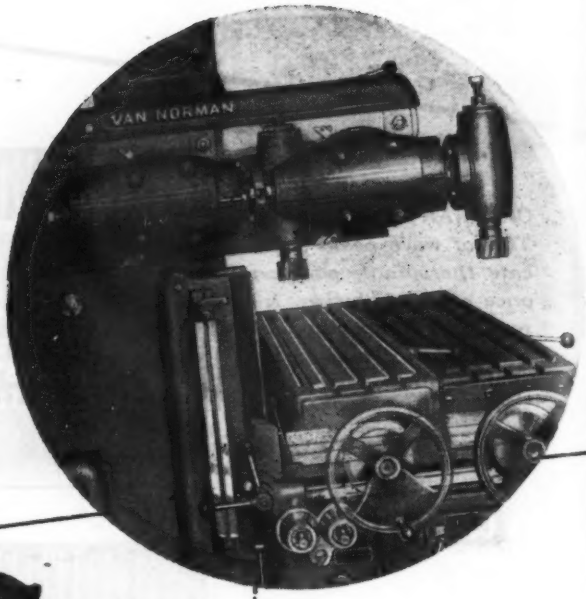


When truing the grinding wheel, the slightest wavering of the spindle causes the diamond to "peck" at the wheel as it travels across the surface, rather than to maintain a smooth, even pressure during the truing operation. On CINCINNATI Grinders the elimination of "diamond pecking" is a reality because FILMATIC Bearings assure a true running spindle, and no flutter means a smoothly trued wheel. The sound of truing a grinding wheel supported by FILMATIC Bearings is like that of tearing fine silk cloth—it's smooth and even. ¶ This, then, is still another advantage in using CINCINNATI Centerless or Centertype Grinders with FILMATIC Bearings because a wheel trued on these machines is sure to produce a higher grade finish without any extra effort or skill on the part of the operator. The facts about this bearing and its advantages are contained in a fully illustrated booklet No. G-446. Write for your copy today.

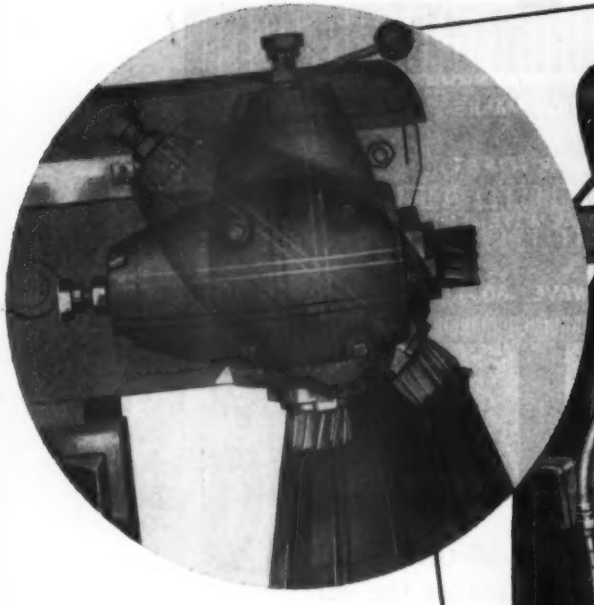
GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

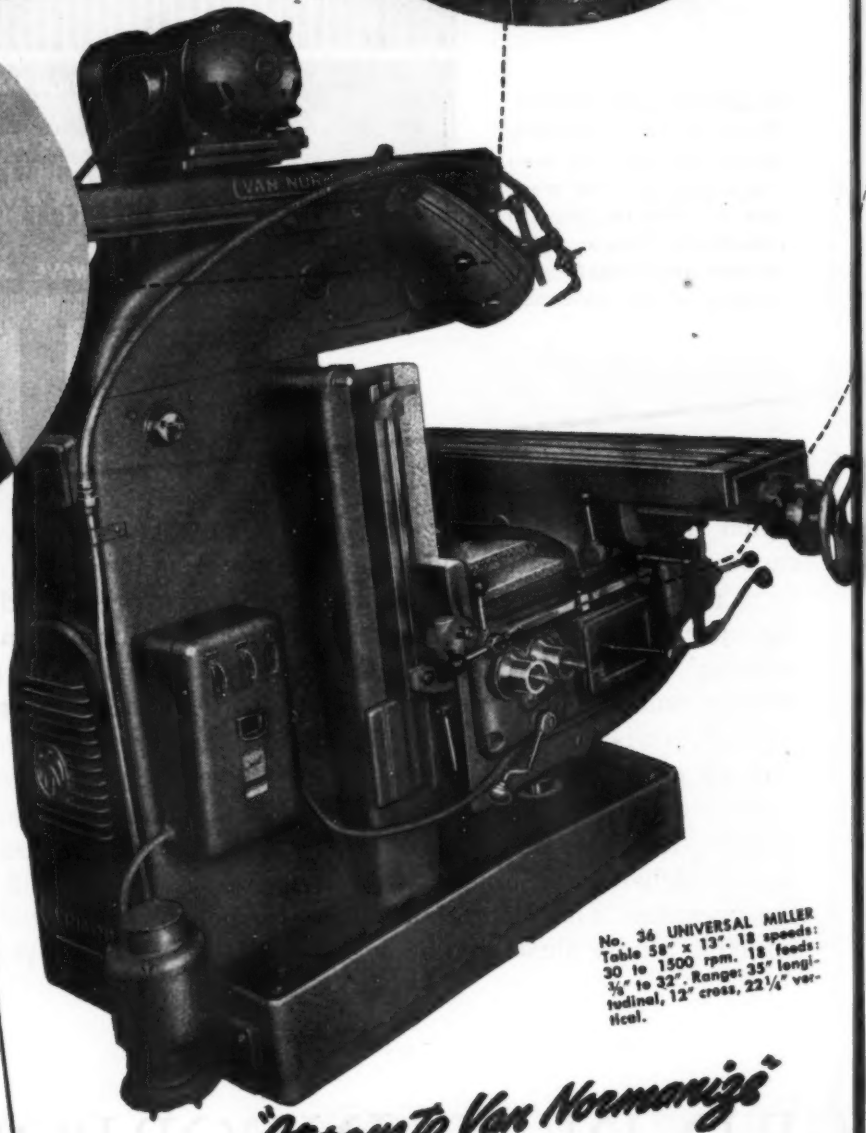
CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES



Adjustable cutterhead and movable ram in combination with the saddle cross feed provides maximum milling capacity and versatility.



Adjustable cutterhead permits vertical . . . horizontal . . . or angular milling all on one machine — gives you the work range of several types of millers . . . greatly reduces work reset-ups.



No. 36 UNIVERSAL MILLER Table 58" x 13". 18 speeds: 30 to 1500 rpm. 18 feeds: ⅛" to 32". Range: 35" longitudinal, 12" cross, 22¼" vertical.

"It pays to Van Normanize"

Front and Rear control of both hand and power feeds gives operator complete control of milling operations from either location.

Van Norman

RAM-TYPE MILLERS

Fit Today's & Tomorrow's Plans without Reconversion

Adjustable Cutterhead, Movable Ram and Front and Rear Operator Controls Eliminate Idle Machine Time, Reduce Worker Fatigue and Increase Production

Are the machine tools you are buying today versatile enough to meet the uncertain, changing conditions of the future?

Van Norman Ram-Type Milling Machines will meet your present milling problems and cut your reconversion problems in post-war retooling. Why? Because these extremely adaptable millers enable you to perform horizontal, vertical and angular milling on one machine by simply positioning the adjustable cutterhead. This Van Norman feature alone increases machine production and cuts costs by eliminating idle machine time by as much as 50%. It also permits operators to carry most milling jobs through to completion without disturbing the original workpiece setup.

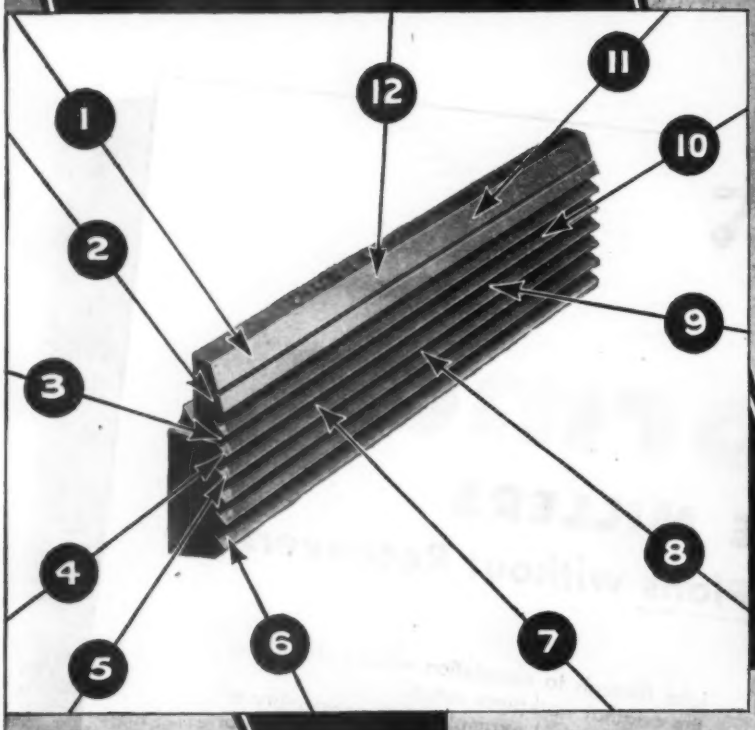
Here's a typical example of the versatility of the Van Norman Ram-Type Miller for tool room or general purpose milling. In any period the milling requirements may call for vertical milling . . . the operator positions the cutterhead in the vertical position, sets up the work and proceeds with the cut. The next period calls for angular or horizontal milling . . . again the operator adjusts the cutterhead and starts his work. Vertical, angular or horizontal . . . Van Norman adaptability meets changing demands with minimum of costly delays and maximum use of your milling equipment. Investigate Van Norman Ram-Type Millers. Find out for yourself how they not only meet all your present milling requirements but fit into your post-war picture. They are available in many models and sizes with plain and swiveling tables.

VAN NORMAN COMPANY
Springfield 7, Mass.

Acclaimed..

The Finest Thread Cutting Tool in Industry

The LANDIS CHASER



Used Exclusively in LANDIS Die Heads and Threading Machines

LANDIS

1-Permanent throat permits close to shoulder threading throughout life of chasers

2-Rake angle range covers all machinable materials

3-Free cutting condition permits maximum cutting speeds

4-Simple grinding operation renews entire cutting edge and leading feature

5-Line contact with work lessens friction and minimizes thread distortion

6-Leading feature insures thread of accurate lead

7-Lateral absorption of cutting strain reduces vibration and chaser breakage

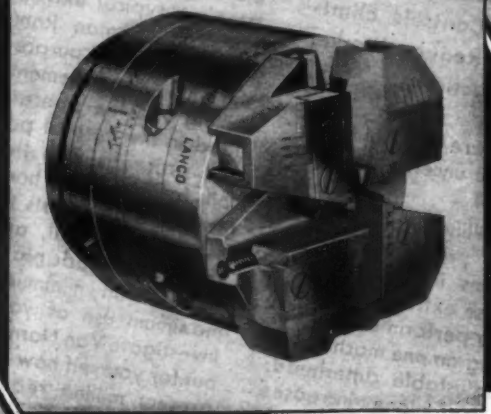
8-Right and lefthand threading feature reduces chaser equipment

9-Standard chasers thread all diameters with proper chaser holders

10-Interchangeability of chasers lowers operating cost

11-Chaser length provides exceptionally long life and low tool cost

12-Permanent throat gives equal distribution of cut



The life of the Landis Chaser, due to its design which makes it possible to machine the thread form along the entire length of the chaser, is from ten to twenty times that of the hobbed type die.

The cutting edge is renewed completely at each regrinding thereby maintaining the original accuracy of the chaser. The throat is not altered by regrinding and therefore permits close-to-shoulder threading throughout the life of the chaser.

Landis Chasers are interchangeable—any one of a set may be replaced.

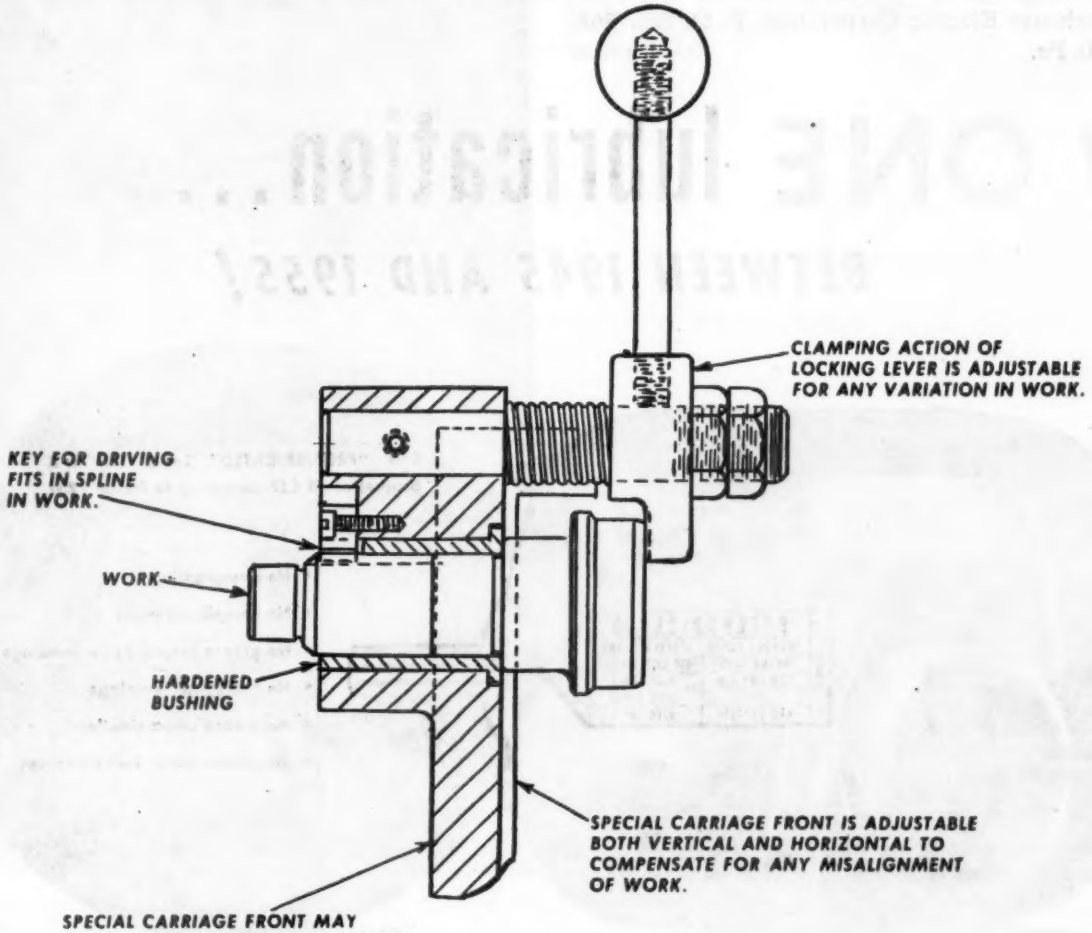
LANDIS MACHINE COMPANY

A Good Mechanic Knows and Cares For His Machine

LANDIS REG. U.S. TRADE MARK PAT. OFF. **THREAD TIPS**

In the Interest of Efficiency, Better Workmanship and Higher Production

SPECIAL CARRIAGE FRONT AND WORK HOLDING FIXTURE-1½ LANDMACO FOR THREADING PROPELLER SHAFT ENDS

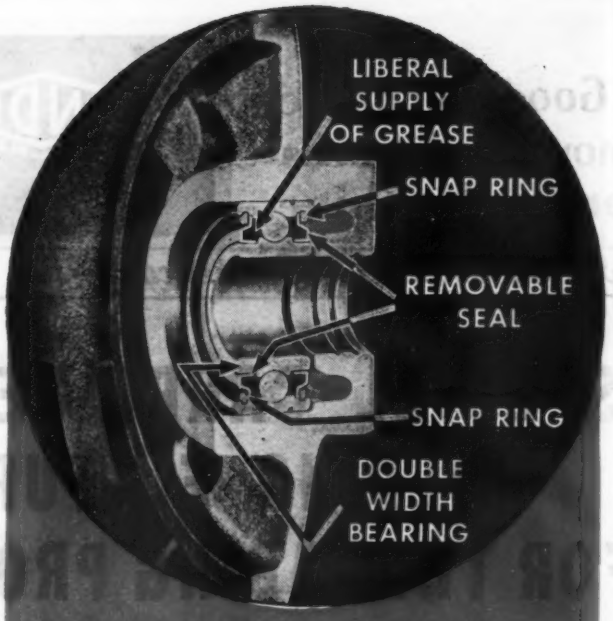

CLAMPING ACTION OF LOCKING LEVER IS ADJUSTABLE FOR ANY VARIATION IN WORK.
KEY FOR DRIVING FITS IN SPLINE IN WORK.
WORK
HARDENED BUSHING
SPECIAL CARRIAGE FRONT IS ADJUSTABLE BOTH VERTICAL AND HORIZONTAL TO COMPENSATE FOR ANY MISALIGNMENT OF WORK.
SPECIAL CARRIAGE FRONT MAY BE REPLACED BY REGULAR CARRIAGE FRONT AND VISE AT ANY TIME WITHOUT ANY SPECIAL MACHINING.

Be Threadwise—Employ LANDIS Long Life Tangential Chasers

WAYNESBORO, PENNSYLVANIA, U.S.A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

ANOTHER WESTINGHOUSE MOTOR "FIRST" WHICH REDUCES INDUCTION MOTOR MAINTENANCE TO A NEW LOW... NOW STANDARD ON TYPE CSP MOTORS, 3 HP AND BELOW



Install now... lubricate once between 1945 and 1955! Think of what this means in terms of man-hours saved—because you can forget lubrication of Type CSP Motors for *5 years* or more after they are installed.

Prelubricated ball bearings are not new in Westinghouse Motors. They have been proved in thousands of textile motor applications—which have run continuously for 7 years and been found in perfect condition after that time.

The CSP motor is another example of the extensive and continuous Westinghouse developments which have contributed to induction motor design. For full information, call your Westinghouse office—ask for DB-3100-CSP, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-21330

only ONE lubrication...

BETWEEN 1945 AND 1955!

This "PRELUBRICATED" Label (on end bracket of all CSP motors up to frame 225)

your assurance of:

- No overgreasing
- No unreplaced plugs
- No grease seepage into windings
- No "skipped" bearings
- No grease contamination
- Simplified lubrication schedules

OTHER ADVANTAGES OF WESTINGHOUSE TYPE CSP PRELUBRICATED MOTORS

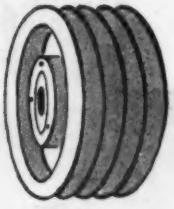
- Longer grease life
- TUFFERNELL Insulation
- *Die-cast Rotor* with oversize fan
- *Dynamically Balanced Rotor*
- *Liberal Through-Ventilation*—air enters front and leaves at drive end of motor

Westinghouse

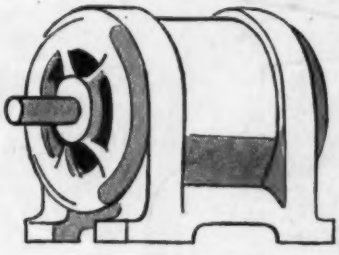
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

TYPE CSP MOTORS

Just like this

this  goes

on or off this



Yes, it's a snap to change sheaves now, when you provide Allis-Chalmers' new "Magic-Grip" — *fastest mounting and demounting sheave on the market.* Saves time and money.

SEE WHY THE NEW "MAGIC-GRIP" MOUNTS FAST, PERFORMS SMOOTHLY

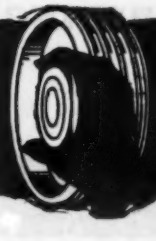
1 Place sheave on shaft. Slides on smoothly because clearance is provided by expanded bushing. There's *no* hammering — *no* forcing! Complete sheave and bushing unit comes intact—ready for quick, easy mounting.

2 Slide to desired position. Sliding easily, sheave can be placed *exactly* according to straight-edge . . . giving you true alignment with resulting smooth performance. A minimum of time is required.

3 Tighten three capscrews — and it's ready to go! Entire sheave is locked securely to shaft and *grips like magic!* No set screws to damage shaft. Send for Bulletin B6310. Allis-Chalmers, Milwaukee 1, Wis.

A 1857

Allis-Chalmers Texrope

"MAGIC-GRIP"  SHEAVES

NEW and IMPROVED 12" x 28"

FOR *Every* GRINDING OPERATION

CYLINDRICAL

INTERNAL

TAPER

SURFACE

TOOL SHARPENING

FORM TOOL

UNIVERSAL and TOOL GRINDER

✓ Multi-Purpose
✓ Flexible Operation
✓ Close Accuracy

Keep your metalworking tools sharp with the new and improved Landis 12" x 28" Universal and Tool Grinder. This modern grinding machine offers speedy, accurate grinding on a large variety of tool room work with standard equipment By means of additional attachments that are available, an exceptionally wide range of grinding jobs can be handled.

Design improvements in this new model include: Universal headstock, spindle and face plate mounted on super-precision preloaded ball bearings; live and dead spindle, converted instantly; variable voltage drive; special protection for all bearing surfaces and working parts from grit and coolant for both wet and dry grinding

Faster production on small grinding jobs is made possible with the Landis 12" x 28" Universal and Tool Grinder, through ease of setup, quick change-over from one setup to another plus the Universal features which include swiveling headstock and swiveling grinding wheel. Surface tolerances can be held to instrument and aircraft accuracy through these exclusive vibration-reducing Landis features: ANNEALED CASTINGS, DYNAMICALLY BALANCED PARTS, WHEEL SPINDLE MOUNTED ON PRELOADED BALL BEARINGS.

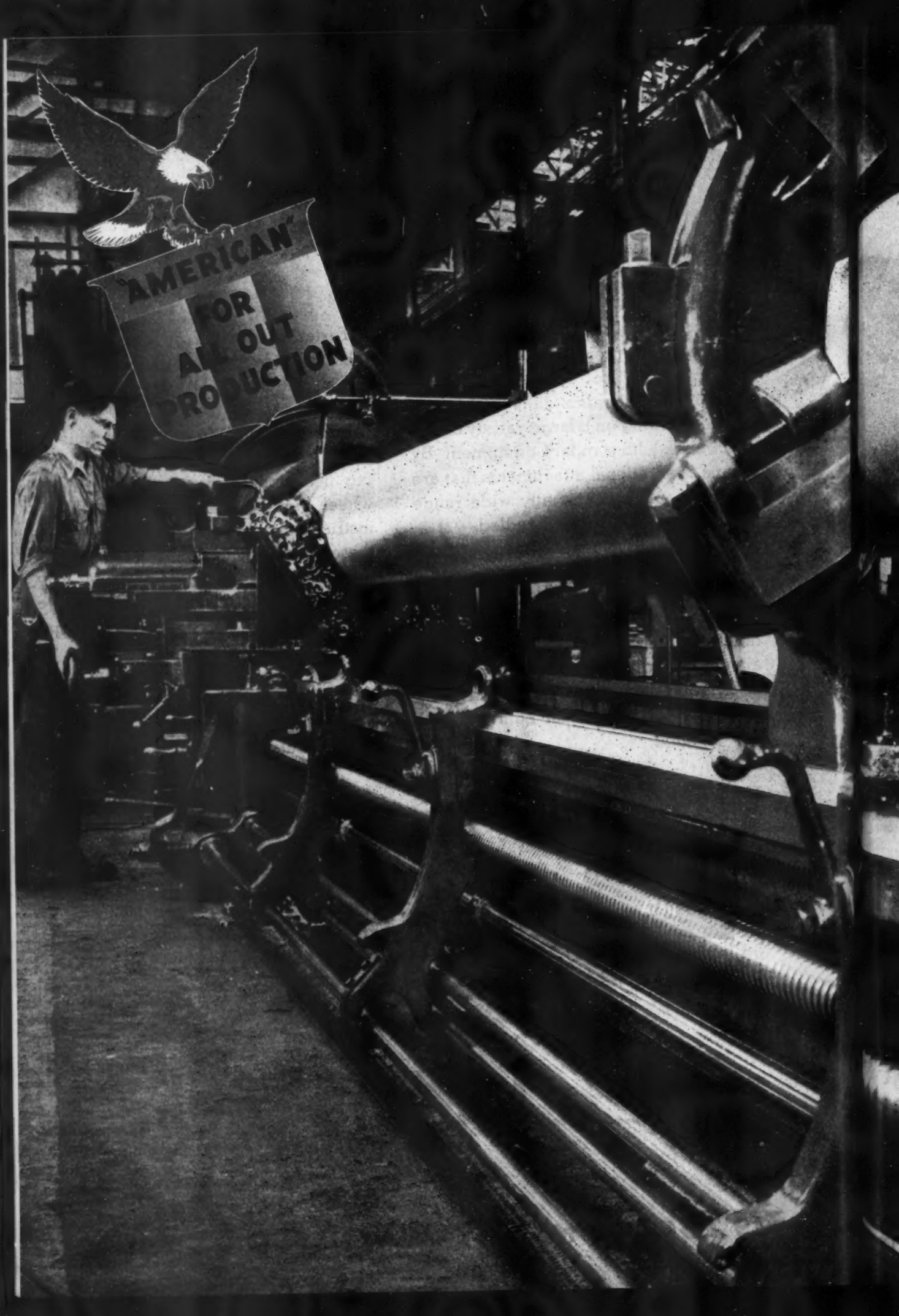
For further information on the most modern and complete Universal and Tool Grinding Machine offered to the trade, request Catalog K-45. 35

CONDENSED OPERATING DATA

Max. Dist. Between Work Centers 28"
Max. Work Swing 12⅜"
Max. Work Dist., Full Size Wheel—12"
Work Speed rpm. 85 to 483
Traverse Speed Range per min. 12"—23"—43"—85"
Headstock—swivels each way 90°
Grinding Wheel
Head swivels each way 90°
Lower base swivels each way 90°
Wheel Feed Increment Range .0001"—.001"

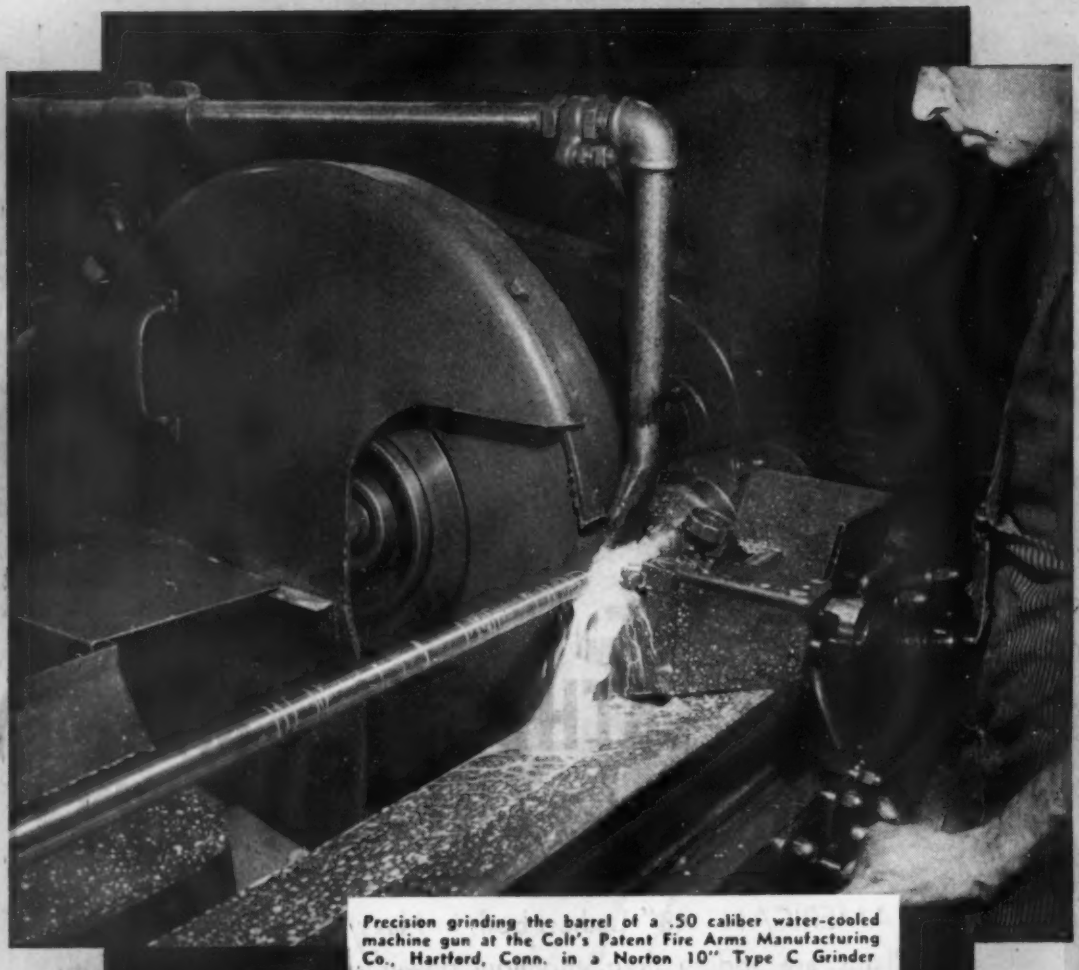
LANDIS TOOL
Precision Grinders

LANDIS TOOL COMPANY • WAYNESBORO, PENNA.


"AMERICAN"
FOR
ALL OUT
PRODUCTION

MIGHTY LATHES Turn MIGHTY SHAFTS for THE U.S. NAVY
"AMERICAN" 48" Lathes, both in Navy Yards and Contractors' Plants, are adding their enormous power and productive capacity to the building of our "two-ocean" Navy.
"AMERICAN" Lathes, from 14" to 48" sizes, are fast—powerful—accurate. They are meeting the challenge of War demands like all true AMERICANS.
THE AMERICAN TOOL WORKS COMPANY
Lathes - Radials - Shapers
CINCINNATI, OHIO, U. S. A.

The Mainstay of Cylindrical Grinding the World Around . . .



Precision grinding the barrel of a .50 caliber water-cooled machine gun at the Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn. in a Norton 10" Type C Grinder

NORTON GRINDERS and Lappers

. . . the NORTON 10" TYPE C

FOR many years high production grinding lines have placed their principal reliance on the Norton 10" Cylindrical Grinding Machine. In the last five years alone thousands of Norton 10" Type C's have been added to prominent production lines.

This confidence has been repaid with high production at low cost — by the ability of this grinder to meet every demand for increased precision and improved finish called for by the advancing techniques of industry.

The same features have been made available in such companion 10" Norton machines as the Semiautomatic, the Full Automatic, the 45 Angular Wheel Slide, the Twin-O-Matic and the Type CD Crankshaft Bearing Grinder.

The qualities of the Norton 10" Type C Grinder will be of the utmost worth in the production of your peacetime products.

NORTON COMPANY, WORCESTER 6, MASS.

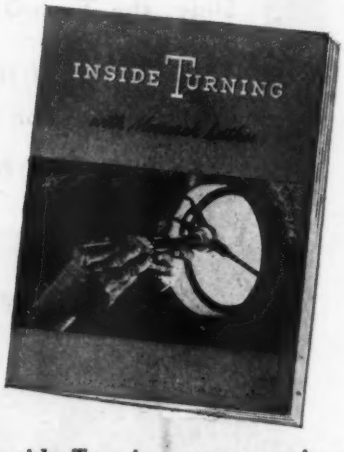
M 505

8 guides

FOR FASTER, BETTER TURNING

These 8 bulletins contain more than descriptions of Monarch Turning Machines. You will find in them many practical, proved methods of short-cutting difficult turning jobs. They illustrate how Monarch machines can be applied to a wide variety of work to reduce cutting costs and time, and to insure higher quality production. Send for any of these bulletins which you think will help you, using the coupon for convenience.

Condensed Catalog **contains brief specifications of Monarch Toolmaker's lathes and production turning machines, illustrating the equipment available for any turning job. Bulletin No. 198.**



Inside Turning **covers various methods of inside turning (boring) on Monarch machines, with special data on multiple boring, counterboring, rough and finish boring in one setting and other time and cost-saving suggestions. Bulletin No. 190.**

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

DIRECT FACTORY BRANCHES

CHICAGO 6, ILLINOIS
622 W. Washington Blvd.
Phone: Randolph 4295

CLEVELAND 6, OHIO
Room 209 Upper Carnegie Bldg.
10465 Carnegie Avenue
Phone: Garfield 2590

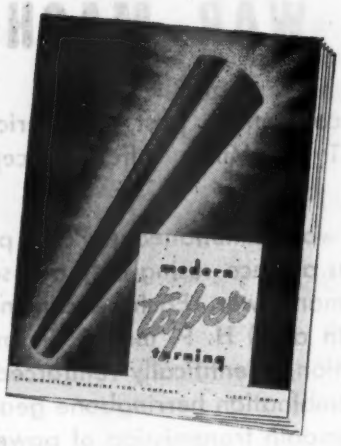
DETROIT 2, MICHIGAN
801 Fisher Building
Phone: Trinity 1-0426

INDIANAPOLIS, INDIANA
Maco Building
38 and College Avenue
Phone: Wabash 2650

NEWARK 2, NEW JERSEY
635 Industrial Office Bldg.
Phone: Mitchell 2-1770

PITTSBURGH 22, PENNSYLVANIA
512 Empire Building
Liberty Ave. and Stanwix St.
Phone: Atlantic 6428

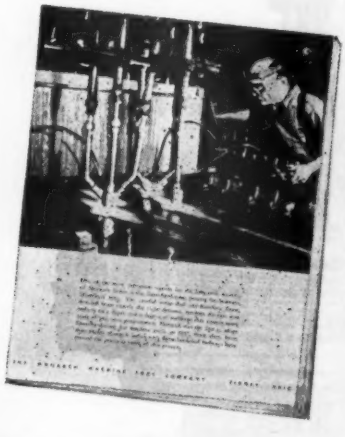
Representatives in Principal Cities



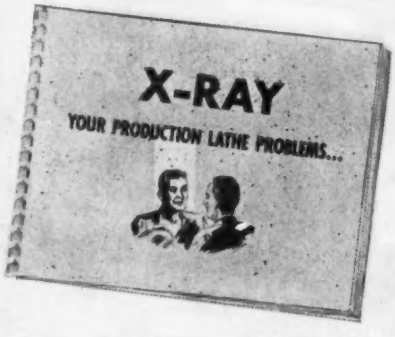
Modern Taper Turning includes practical examples of cost-reducing methods on various kinds of taper turning, form turning and boring. If your production includes taper work, this bulletin will help you. Bulletin No. 1955A.

The Shapemaster shows the use of the Monarch Shapemaster Form-turning machine for the production of multi-sided shapes in irregular contour pieces. Especially useful for makers of dies and molds for metal, glass or plastic production. Bulletin No. 199.

Special Cost Cutting Machines covers the turning of unusual or complicated work with special Monarch Turning Machines or attachments. Describes time and cost-saving methods used in a wide variety of work. Bulletin No. 193.



Flame-hardening describes the advantages of Monarch's Flame-hardening method for lathe beds which accounts to a large extent for the continued accuracy of Monarch machines even after years of hard use. Bulletin No. 194.



X-Ray Your Turning Problems... shows the production economies obtainable by the use of the improved Monarch Magnamatic, fully automatic, electrically controlled turning machines. For plants interested in automatic or semiautomatic production of long or short runs, this bulletin is invaluable. Bulletin No. 186.

10" Hi-speed Manufacturing Machine . . . This bulletin covers one of Monarch's new machines for exceptionally fast, low-cost, precise production of small parts. Proved in a wide variety of close tolerance aircraft and other production, this machine will find wide use in peacetime. Bulletin No. 10M.

THESE GUIDES TO BETTER PRODUCTION AT LOWER COST WILL BE SENT ON REQUEST. JUST FILL IN AND MAIL COUPON, WITH YOUR LETTERHEAD, to The Monarch Machine Tool Company, Sidney, Ohio

PLEASE ATTACH COUPON TO YOUR LETTERHEAD

☐ Condensed Catalog ☐ Inside Turning ☐ Modern Taper Turning ☐ Shapemaster
☐ Special Machines ☐ Flame-hardening ☐ Magnamatic Machines ☐ 10" Hi-Speed Machine

Name.....Title.....

Company.....

Street and City.....

YOUR PLANT NEEDS THIS POST WAR MACHINE

QUAD-ACTION

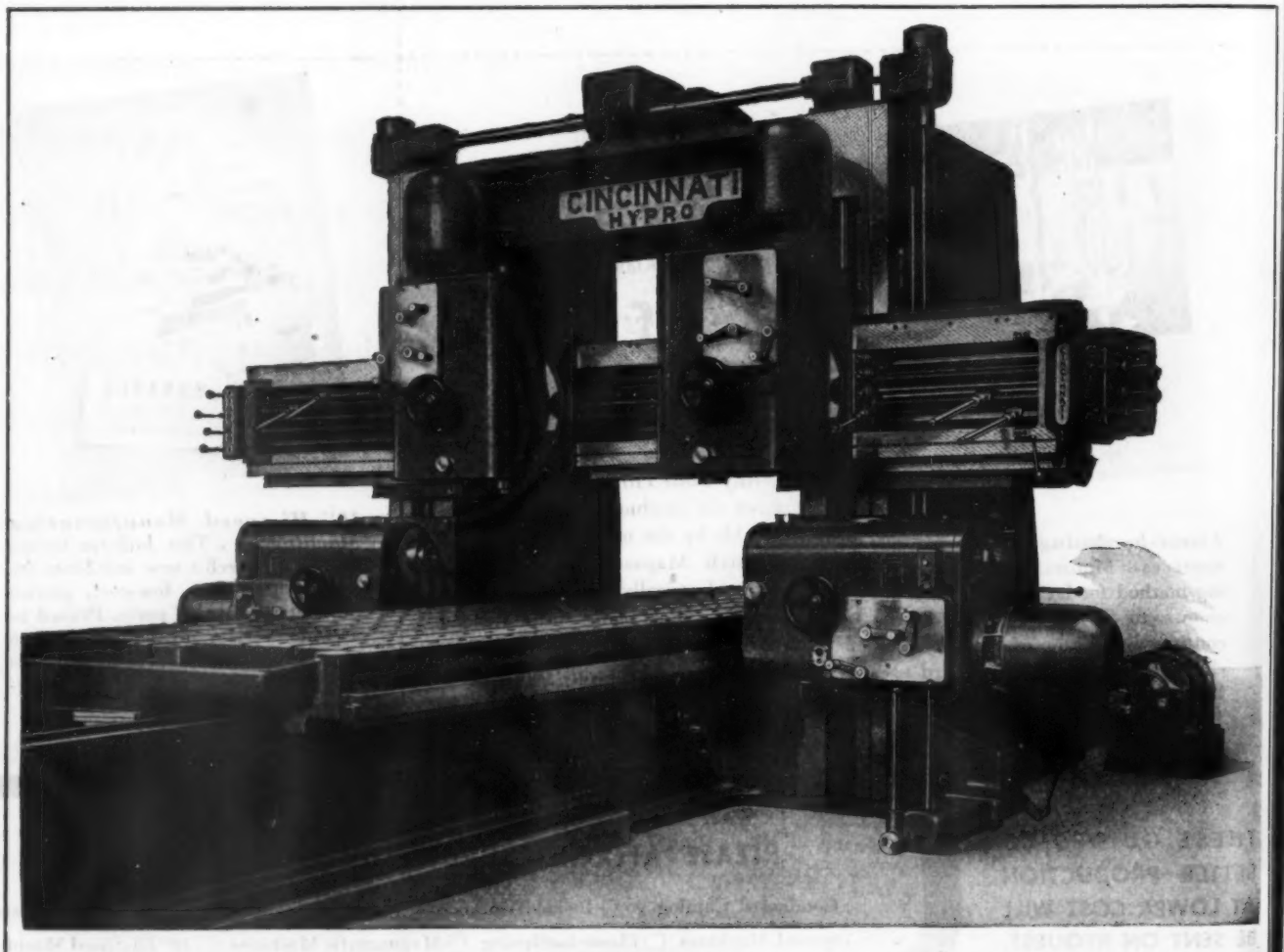
HYPRO

PLANER TYPE MILLING MACHINE

In the highly competitive post war period, the Hypro Planer Type Miller offers exceptional advantages.

Its four heads work simultaneously and perform several operations at once—using only one set-up—saving time and manpower. Each head is individually powered with a 10 H. P. motor. Its massive, compact construction, scientifically reinforced, adds to its rigidity. Combination herringbone gear drive to table assures smooth transmission of power, free from all side thrusts and guaranteeing extreme accuracy.

For more information regarding this versatile machine and its application, write today for Catalog AM-105.



THE CINCINNATI HYPRO PLANER COMPANY

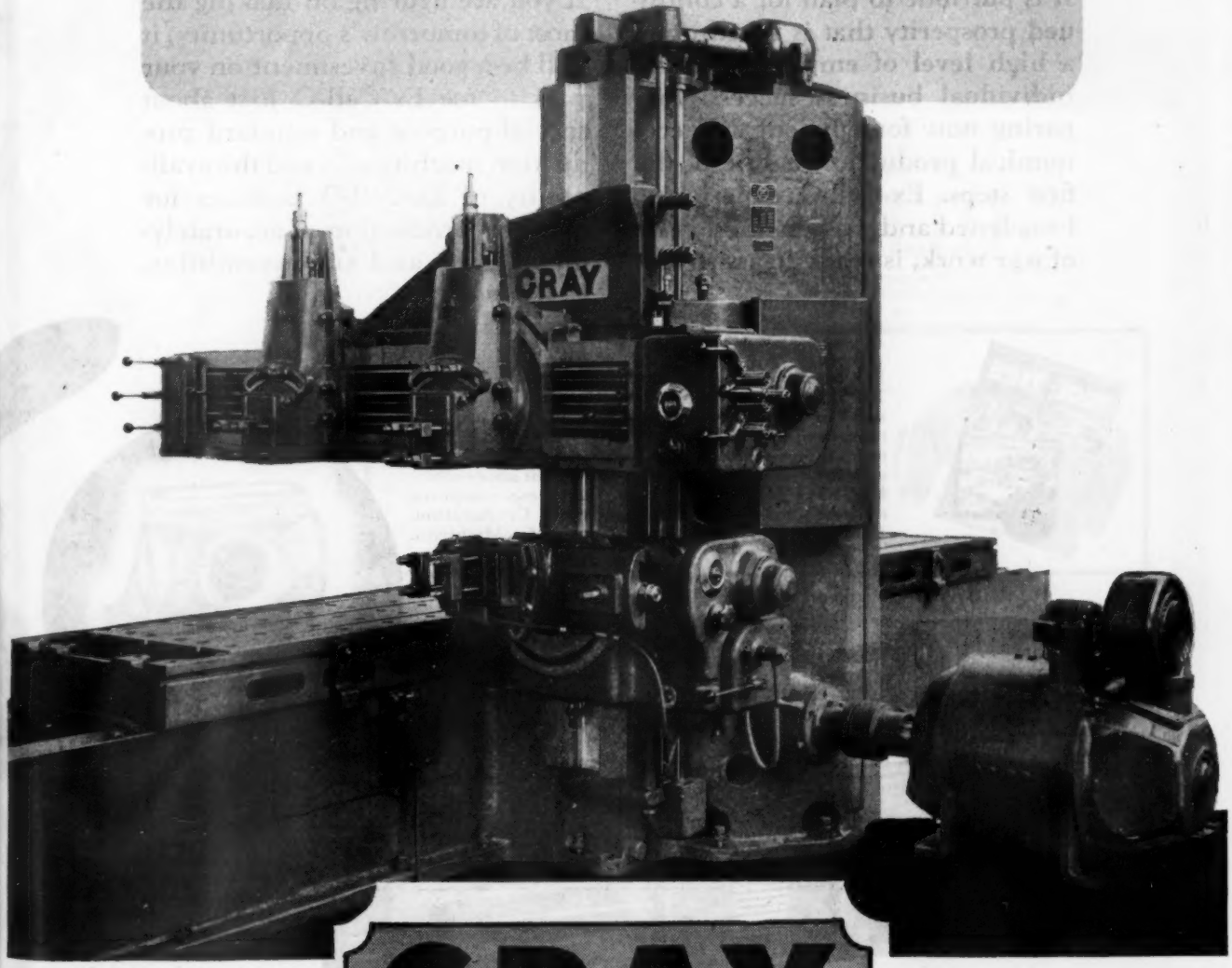
PLANERS - BORING MILLS - PLANER TYPE MILLERS

CINCINNATI, OHIO

SMALL but RUGGED

● Note that the column has the same cross section from the bottom to the top thus insuring maximum rigidity on high work. This valuable, distinctive feature is typical of the entire line of GRAY OPENSIDE PLANERS from this 36" to the 120".

Write for descriptive circular



THE G. A. GRAY COMPANY

3610 WOODBURN AVENUE • • • CINCINNATI 7, OHIO, U. S. A.

THE GRAY LINE — Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Boring Machines

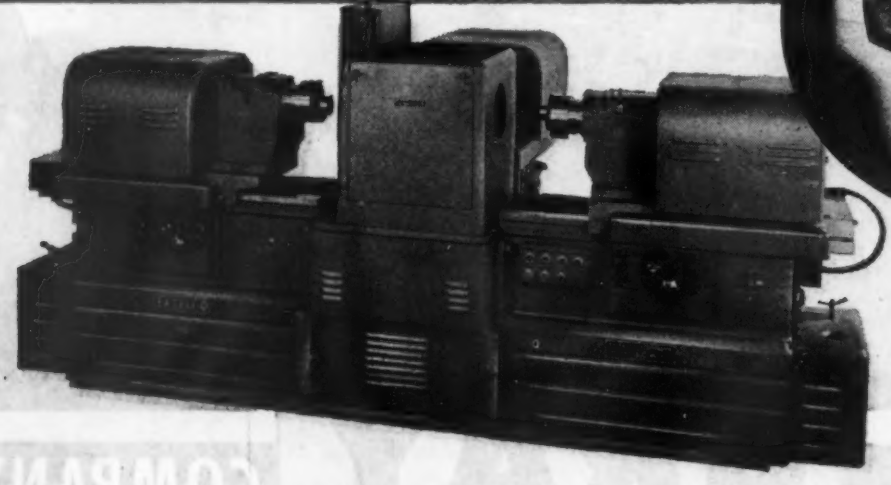
The World He's Fighting For DEMANDS PLANNING NOW

If Low Unit Cost Is An Essential Part Of Your Reconversion Planning *See* EX-CELL-O *First*

It is *patriotic* to plan for a continued prosperity that is based upon a high level of employment and individual business success. Preparing *now* for efficient and economical production is one of the first steps. Ex-Cell-O experience, broadened and deepened by years of war work, is ready to assist you.

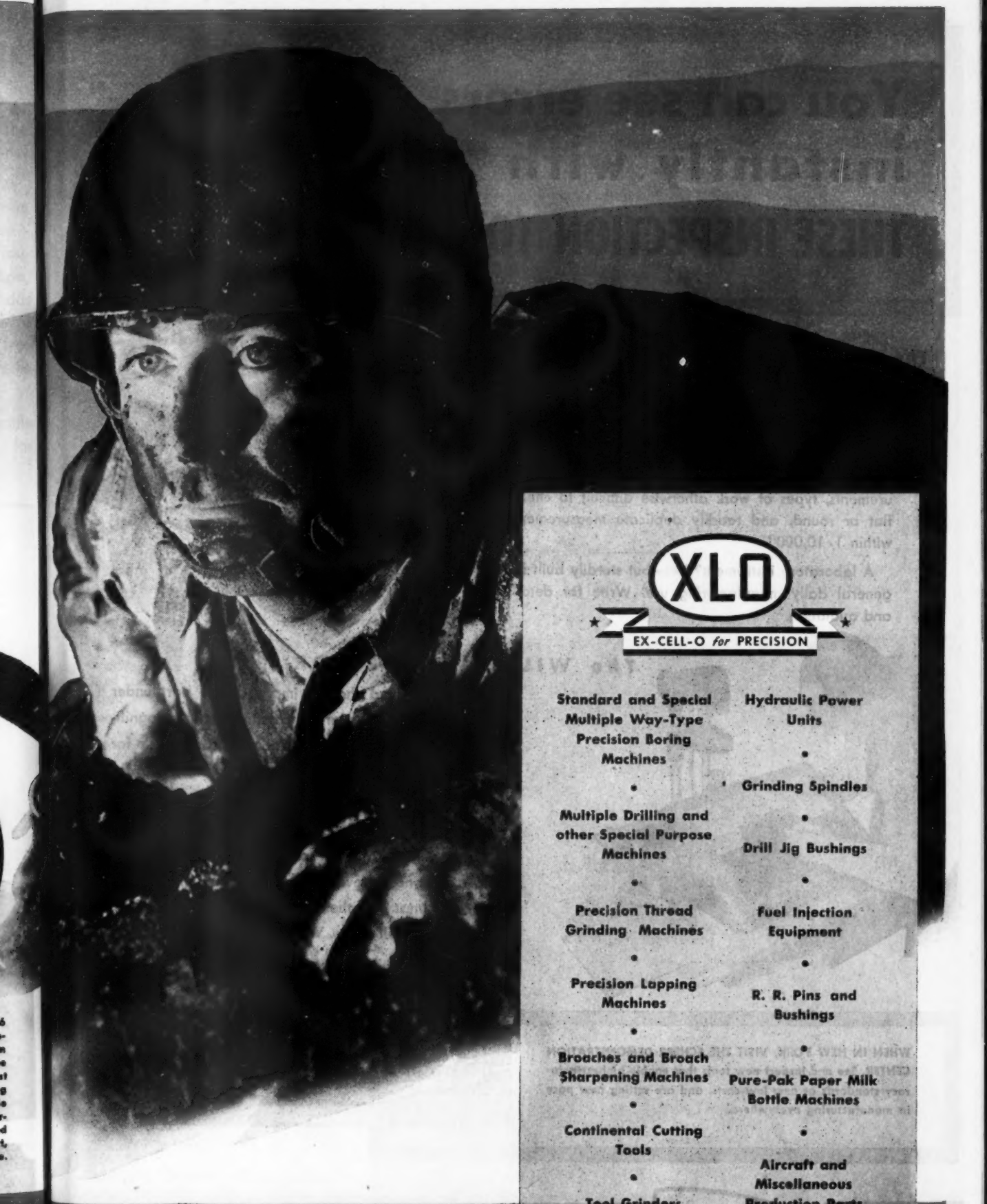
If you are figuring on making the most of tomorrow's opportunity, it will be a good investment on your part to *see* Ex-Cell-O *first* about special-purpose and standard production machines . . . and the availability of Ex-Cell-O facilities for quantity production of accurately-made parts and sub-assemblies.

For twenty years Ex-Cell-O has published TOOL TIPS, a monthly magazine that gives illustrated news of metal-working developments and applications in the precision machining field. In each issue there is varied material of practical interest to both workers and management. If you do not now receive Ex-Cell-O TOOL TIPS, send your name, company, address and position to Ex-Cell-O Corporation, 1200 Oakman Boulevard, Detroit 6, Michigan.



To left: This Ex-Cell-O Style 56 Precision Three-Way Machine provided the answer to the problem of simultaneous boring of three holes—two in line and the third at 90°—in a malleable iron mounting (shown above). The machine cycle is automatic, allowing the operator time to inspect the finished part, or to get ready a new part, or to operate another machine.

EX-CELL-O CORPORATION



XLO

EX-CELL-O *for* PRECISION

Standard and Special Multiple Way-Type Precision Boring Machines

•

Multiple Drilling and other Special Purpose Machines

•

Precision Thread Grinding Machines

•

Precision Lapping Machines

•

Broaches and Broach Sharpening Machines

•

Continental Cutting Tools

•

Tool Grinders

Hydraulic Power Units

•

Grinding Spindles

•

Drill Jig Bushings

•

Fuel Injection Equipment

•

R. R. Pins and Bushings

•

Pure-Pak Paper Milk Bottle Machines

•

Aircraft and Miscellaneous Production Parts

•

45—80

DETROIT, MICH.

You can see errors instantly with THESE INSPECTION TOOLS

The GAERTNER TOOLMAKERS MICROSCOPE

You can't miss errors magnified 30 times. Any gage, tap, template, hob, etc., etc., when checked in the Toolmakers Microscope will instantly show any deviation from correct contour or dimension at any point. You can check all thread measurements, angle measurements, types of work otherwise difficult to check, flat or round, and readily duplicate measurements within 1/10,000".

A laboratory instrument? Yes—but sturdily built for general daily manufacturing use. Write for details and quotation.

The WILDER PROJECTOR

Throws a magnified shadow image of the part under inspection against an enlarged drawing of part. Magnifications available, 10x to 100x. Horizontal work table for flat work. Center support and micrometer cross slides for checking forming tools, screw threads, hobs, etc.

The Wilder Projector eliminates all errors due to measurement by "feel". May be speedily operated, with little or no experience. Prevents costly mistakes and insures initial correctness from the start of a production run. Price within means of all shops. Write for data and quotation.

WHEN IN NEW YORK, VISIT THE SCHERR DEMONSTRATION CENTER. See and inspect new tools that enable highest accuracy standards at new low costs, and are setting new pace in manufacturing everywhere.

GEO. SCHERR CO., Inc. 201 LAFAYETTE STREET NEW YORK 12, N. Y.

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

The National Interregional Highway Committee and the American Trucking Association have agreed on the continuance of the schedules of truck sizes and weights accepted by the states for the war emergency. *Engineering News Record.*

get ready with CONE for tomorrow

An electronic tube has been developed capable of amplifying grid currents as minute as .00000000000001 ampere. *Ohmite News.*

get ready with CONE for tomorrow

Two industrial plants have installed steam-heated sidewalks to make snow shoveling unnecessary. *Sarco Mfg. Co., Bethlehem, Pa., Hewitt Rubber Co., Buffalo, N. Y.*

get ready with CONE for tomorrow

A compound called "2-4-D" is being tested on golf greens. It appears to be successful in selectively killing weeds without damaging the grass. *Science Digest.*

get ready with CONE for tomorrow

More than 200 industries, including the manufacturers of chewing gum, glass, synthetic rubber, drugs, textiles, paper and printing are finding that controlled heat and humidity (air conditioning) are essential to their work. *Wall Street Journal.*

get ready with CONE for tomorrow

A new laboratory exclusively for the study of jet propulsion fuels and lubricants has just been put into operation. *Wood River, Illinois.*

get ready with CONE for tomorrow

An electronic device rides with a test pilot and sends back eighty instrument readings per second covering stresses, temperature and speed. *Consolidated-Vultee.*

get ready with CONE for tomorrow

A new variation of the magnetic sound recorder uses a paper tape covered with powdered iron. It is claimed to be cheaper and more efficient than wire. *Radio & Television Retailing.*

This country's production of electrical instruments has increased 4,000 per cent since the beginning of the war. *Electrical Manufacturer's Public Information Center.*

get ready with CONE for tomorrow

A new semi-precious stone derived from deposits in this country is called "Hemetine." *Gabriel Williams Co., N. Y.*

get ready with CONE for tomorrow

A new pencil is said to make 12 carbon copies without cutting the paper. *Reliance Pencil Co., Mt. Vernon, N. Y.*

get ready with CONE for tomorrow

One of the suggested improvements in locomotive power is the use of mercury vapor in place of steam. *Business Week.*

Lace can now be made on a foundation of polyvinyl alcohol sheeting which is easily dissolved after the weaving is done. *E. I. duPont deNemours.*

get ready with CONE for tomorrow

An automatic headlight dimmer uses an "electric eye" to dim the lights on one car when the lights of another approach it. *Arrow Safety Device Co., Mt. Holly, N. J.*

get ready with CONE for tomorrow

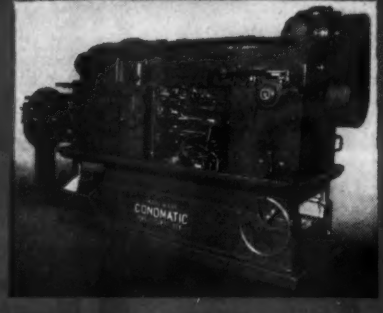
Tetra Cresyl Silicate has been found far superior to water for the transference of heat. By its use a temperature of 800 degrees could be piped around the house from a central plant and could be used to heat stoves, irons, water tanks, or small appliances. Connected in summer to a refrigerating plant, it could also cool the house. *Science Digest.*

get ready with CONE for tomorrow

One of the largest American drug manufacturers has set up a "pilot farm" to experiment with the growing of drug plants that were formerly imported. *S. B. Penick & Co., N. Y.*

The Important SECOND

Modern production emphasizes the second, and users of the 8-spindle Conomatic think of parts like these in terms of seconds. The return of peace, and of peacetime production, will place even greater emphasis on the second — and on the importance of the Conomatic.



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

29

Allis-Chalmers Electrodes Have Got To Be Good!

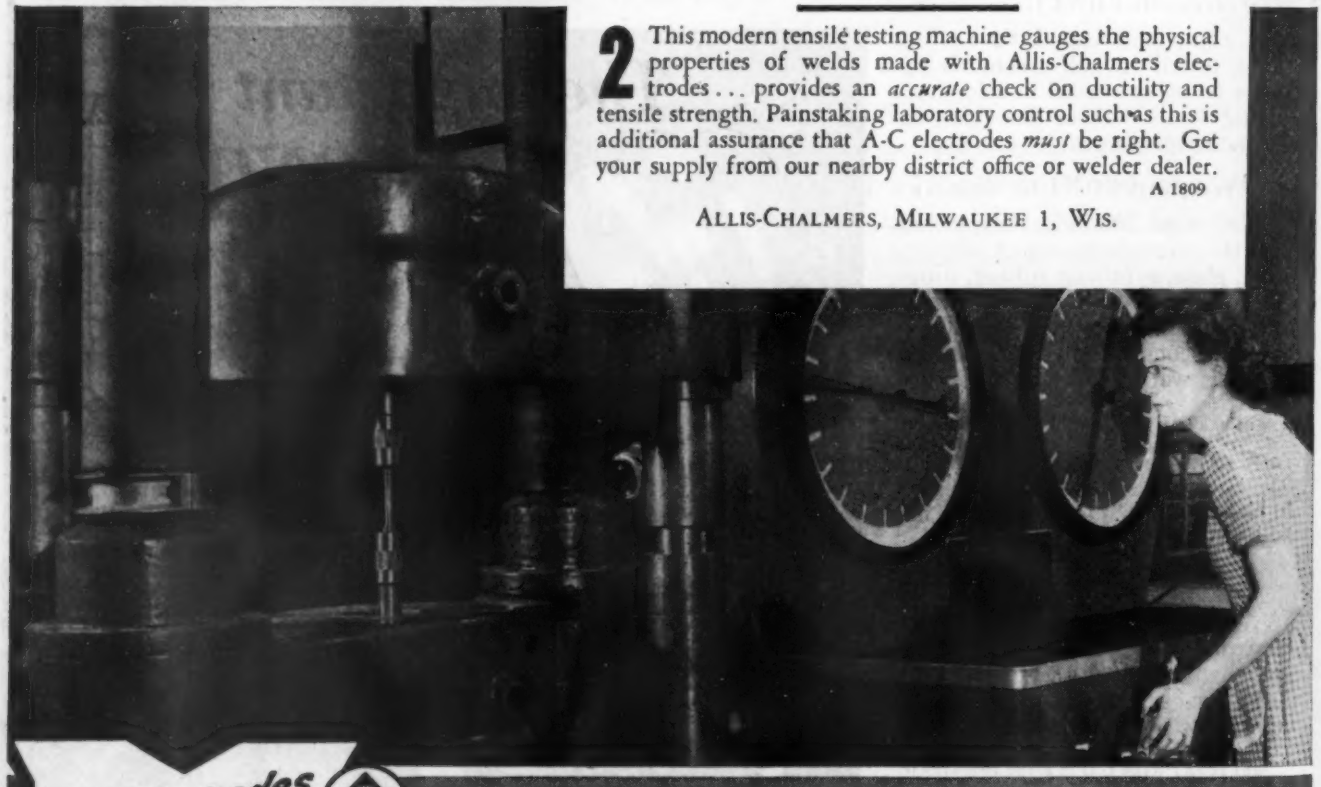
BECAUSE: 1) We use tons of them every day *ourselves*... 2) We constantly test weld metal by X-Ray, tensile machine, metallographic microscope — to assure continual high quality of electrodes.

1 Being one of the world's largest *users* of welding equipment, we are able to *production-prove* our electrodes in our own Allis-Chalmers shops—under every type of welding condition. Large welding jobs such as this heavy compressor cylinder are everyday routine. Successful welding of this work *depends* on the quality of Allis-Chalmers electrodes. They've *got* to be good!

2 This modern tensile testing machine gauges the physical properties of welds made with Allis-Chalmers electrodes... provides an *accurate* check on ductility and tensile strength. Painstaking laboratory control such as this is additional assurance that A-C electrodes *must* be right. Get your supply from our nearby district office or welder dealer.

A 1809

ALLIS-CHALMERS, MILWAUKEE 1, WIS.



A-C Electrodes
EASY TO REMEMBER
EASY TO BUY
Sold by AWS Number

HEADQUARTERS FOR WELDING EQUIPMENT

AMPAC A-C WELDERS

WELD-O-TRON D-C WELDERS

ARC WELDING ACCESSORIES

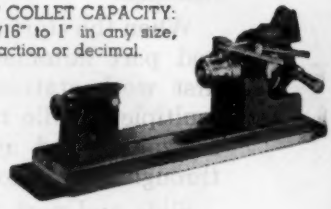
HARDINGE HORIZONTAL-VERTICAL

Collet Index Fixtures with Threaded Nose Spindle are fast in operation and hold work accurately

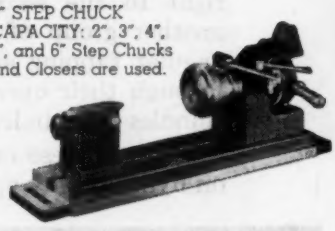
In addition to taking standard collets, this fixture takes step chucks and jaw chucks to cover a wide range of applications. It will eliminate the necessity of your tool room making many specially designed fixtures. Thus, your engineers and tool-makers will have more time for other work.

A preselector arrangement provides the selection of separate indexing of any number divisible into 20 or 24. The collet closer lever has a 100 to 1 leverage for quick opening and closing of collets and step chucks. Write for bulletin.

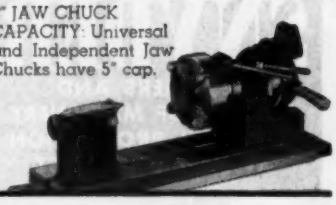
1" COLLET CAPACITY: 1/16" to 1" in any size, fraction or decimal.



6" STEP CHUCK CAPACITY: 2", 3", 4", 5", and 6" Step Chucks and Closers are used.



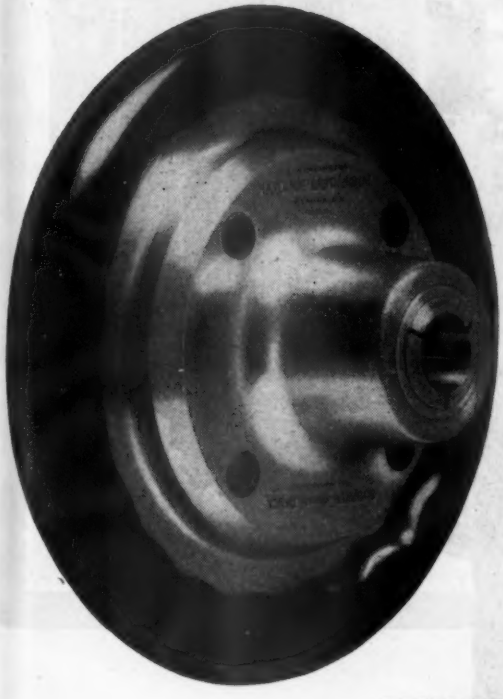
5" JAW CHUCK CAPACITY: Universal and Independent Jaw Chucks have 5" cap.



HARDINGE
ELMIRA, N.Y.

HARDINGE-SJOGREN SPEED COLLET CHUCKS

increase production of your lathes and milling machines



A Hardinge-Sjogren Nose Type Speed Collet Chuck enables you to get full value from your toolroom lathes, engine lathes and milling machines. It gives greater capacity, saves time, increases accuracy and assures better results. An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure. Production is increased as the operator is always in front of his work. Available in three sizes for 1", 1⅜", or 1¾" collet capacity. Write for complete bulletin.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Snyder Special TAPS 61 HOLES IN AIRCRAFT PART

Tapping 61 holes of various diameters and in various positions on a large aircraft housing is the job for which Snyder designed and built this automatic-cycle special-purpose machine.

When the starting button is pressed, slide and part automatically move left to the first work station where a large vertical multiple spindle tapping head and several horizontal and angular tapping units go through their automatic cycle operation.

Slide and part then automatically move right to the second work station where another group of vertical, horizontal and angular tapping spindles automatically go through their operating cycle. All tapping spindles have individual lead screws.

Some of these tapping units are installed on hydraulically operated sub-slides to provide rapid advance of the unit before lead screw tapping. For example, the vertical head in the left hand station has a large group of spindles on the periphery which has no hydraulic advance. However, a cluster of spindles in the center of the head is automatically advanced into tapping position several inches lower than the outer spindles.

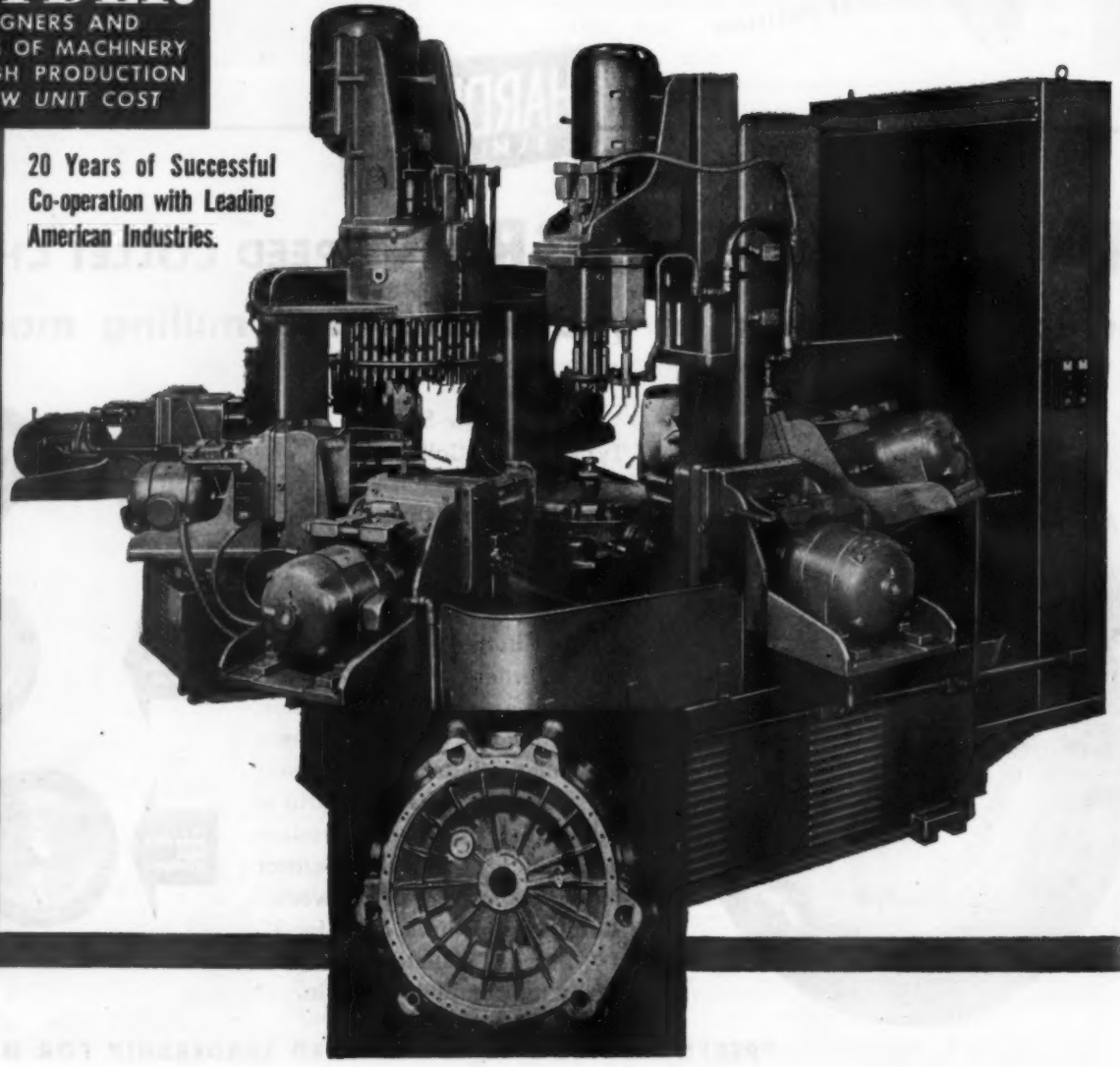
Master control is near loading position and each tapping unit has individual push button station for set-up purposes. Machine base is welded steel.

If your present or prospective operations can benefit from establishing complete control of production speed, accuracy and finish, Snyder special-purpose machines may be the answer. We invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette, Detroit 7, Michigan.*

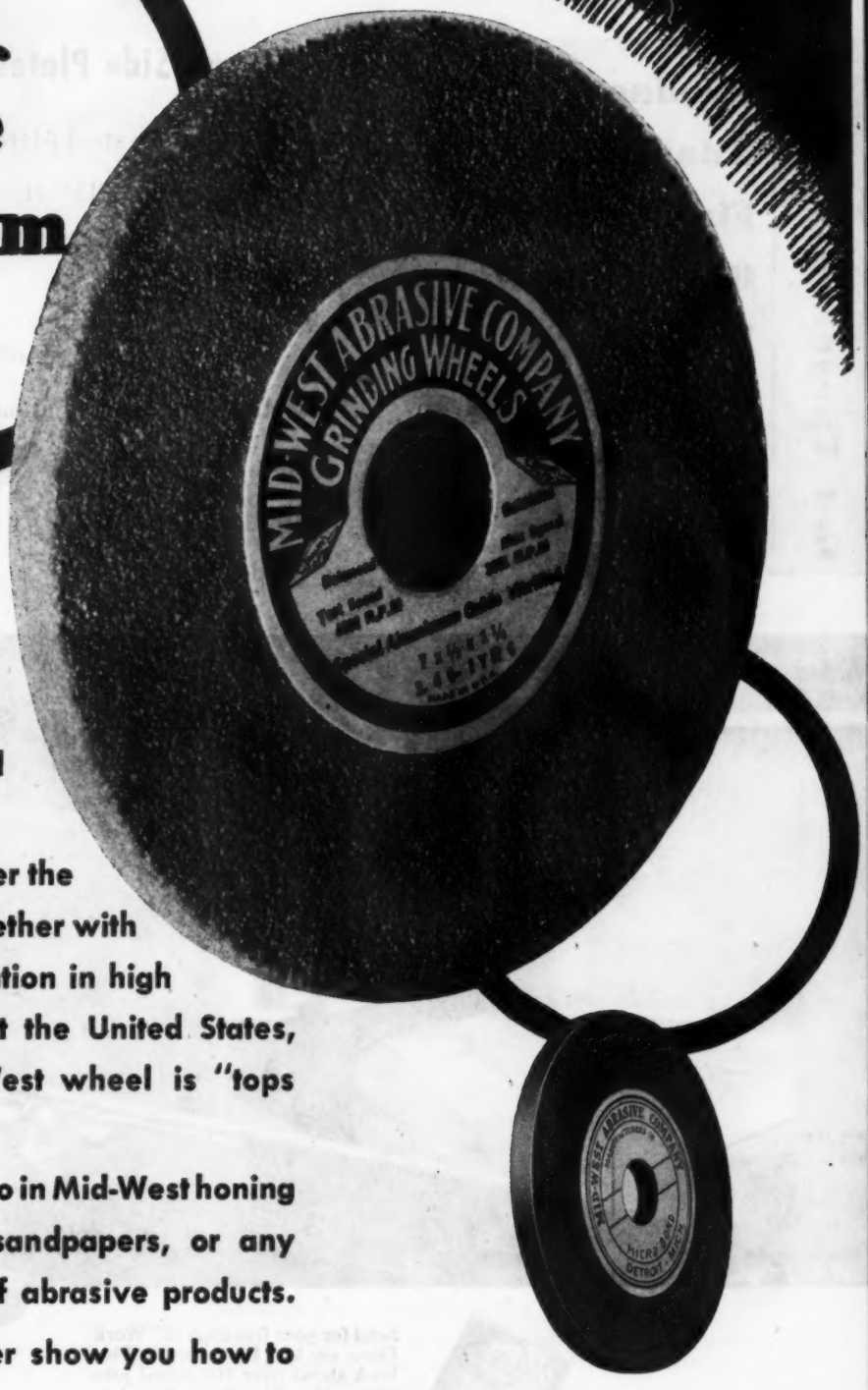
SNYDER

DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST

20 Years of Successful Co-operation with Leading American Industries.



"Tops" for the Tool Room



● **The new tool room grinding wheel of the Mid-West Abrasive Company clearly shows its superiority in high speed tool steel operations.**

Test after test, conducted under the most rigorous conditions, together with many months of actual operation in high production plants throughout the United States, demonstrate that the Mid-West wheel is "tops for the tool room."

You'll find this exemplified also in Mid-West honing stones, sharpening stones, sandpapers, or any of Mid-West's broad range of abrasive products.

Let a Mid-West field engineer show you how to solve your abrasive problem.

MID-WEST ABRASIVE CO.

Manufactures of DEPENDABLE Abrasives

Owosso, Mich. • Detroit • Rochester, Pa.

"Put it on the Blanchard"

Get These Advantages

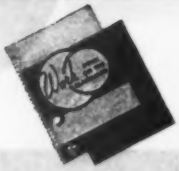
- Production ✓
- Adaptability
- Fixture Saving ✓
- Operation Saving
- Material Saving
- Fine Finish
- Flatness
- Close Limits ✓

.50 cal. Side Plates on No. 18 — 36" Chuck

These alloy steel plates are ground in three operations, first removing .015" stock from each side and then finish grinding the first side, removing .010" stock, to limits of ± .00075".

The 36" chuck affords ample area for chucking such rectangular pieces, about 2 feet long. The outer chuck ring is used to retain the pieces on the chuck and their area and thickness are such that no other blocking is needed.

W-812



Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

This job being done on the No. 18 Blanchard Surface Grinder

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

What would be your Total Time on this Hot Press Die Job?

Courtesy —
Revere Copper & Brass Inc.
Dallas Division

This Hot Press Die, used for hot pressing spigot handles, was completed in a total time of 9 hours on a Milwaukee 2D Rotary Head Milling Machine. Compare this job report with your own methods:

Material — Hot Work Die Steel
Operation — Sink Cavities Complete
Time Distribution — Mill Cavities - 6 hrs.
bore core holes - - - - - - - - 1 hr.
drill ejector pin holes - - - - ½ hr.
mill relief around impression - - 1½ hrs.
Total Time - - - - - - - - - 9 hrs.

Check these advantages of the Milwaukee Rotary Head Milling Machine and how you can benefit from them in your own shop:

DIRECT . . . mills intricate shapes in a single setup without the aid of templets or models — transmitting blueprint dimensions and outlines directly to the workpiece.

ACCURATE . . . chances for error are eliminated because there is no change in setup. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

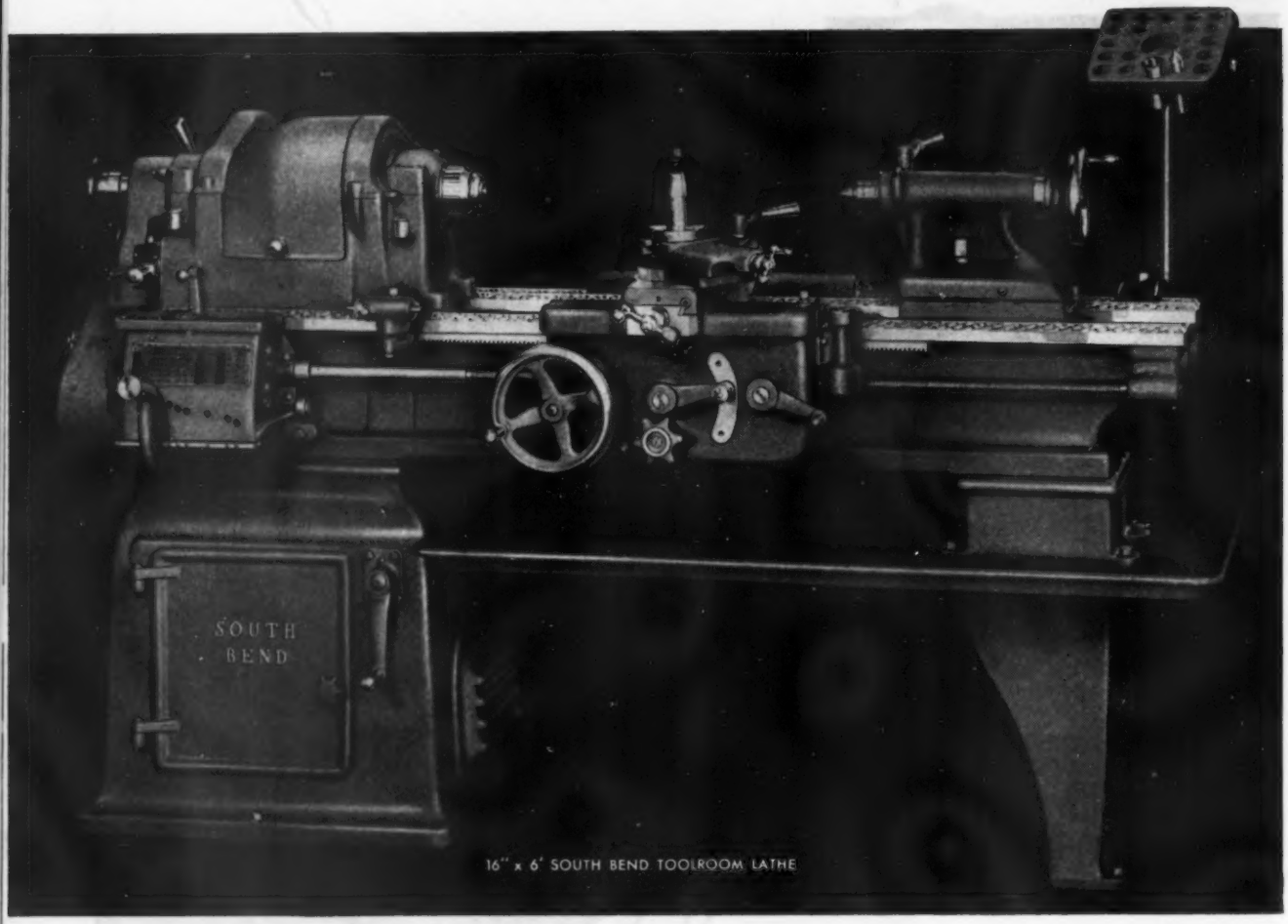
FAST . . . initial job preparation and setup time are reduced to the minimum. Accurate performance of the machine saves operator's time and results in rapid production of work otherwise difficult to perform.

Write for Bulletin No. 1002C and complete information.

BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • MIDGETMILL • SPEEDMILL • FACE MILL GRINDER • AUTOMETRIC JIG BORER • CENTER SCOPE.

Kearney & Trecker
Products
CORPORATION
Milwaukee 14, Wisconsin
Subsidiary of Kearney & Trecker Corporation

South Bend Lathes



16" x 6' SOUTH BEND TOOLROOM LATHE

Built to High Standards of Precision

Throughout the process of manufacture, parts and units for South Bend Lathes are frequently inspected to assure accuracy in the finished product. Hundreds of precision gauges, special measuring devices, and instruments are used. Final tests are made with the lathe in operation. Each lathe must machine work to extremely close tolerances before it is approved for shipment from our factory.

Because these quality controls give them dependable precision, South Bend Lathes have long been favorites in the toolroom. For this same reason, plus a fatigueless ease of operation, they are equally popular for manufacturing operations.

WRITE FOR NEW CATALOG 100-D

Illustrates in full-color and describes South Bend Engine Lathes and Toolroom Lathes with 9", 10", 13", 14½", and 16" swings. Also, Precision Turret Lathes with ½" and 1" collet capacities.

SOUTH BEND LATHE WORKS

419 EAST MADISON STREET, SOUTH BEND 22, INDIANA • *LATHE BUILDERS FOR 38 YEARS*

Continued

Grinding Questions Answered

By Allen Steele, Manager, Dayton Grinding Wheel Division
SIMONDS WORDEN WHITE COMPANY

This series of questions and answers is presented as a practical aid in the solution of many of the more common grinding problems. Readers are invited to send in their own grinding questions, without obligation of any sort. All questions will be answered by mail or in this column. No identities will be revealed if published.

32 Q. *"What are the factors which determine how soft or hard a wheel should be in thread grinding?"*

A. In thread grinding, the grade or hardness of the wheel is chiefly determined by the size of grain or grit to be used. As a rule, the finer the grain or grit, the harder the grade which is just opposite the rule usually followed in other grinding operations.

33 Q. *"What is the best type of coolant to use when grinding gear teeth?"*

A. Like so many other questions which arise in practically all grinding operations, the type of coolant best suited for the grinding of gear teeth is often a matter of personal choice or opinion. There are shops where a mixture of soluble oil and water is used. Some use a soda water coolant. Still others prefer a "grinding oil." The latter is probably the most widely used and appears to be steadily gaining new converts.

34 Q. *"Will you please publish a check-list covering the proper procedure for balancing wheels 18" and larger in diameter?"*

A. If the wheel arbor is provided with two weights, the procedure for balancing is as follows: (1) Remove the weights and lift the wheel onto the balancing ways; (2) when the heavy side of the wheel finally comes to rest at the bottom, mark the extreme bottom point with a piece of chalk; (3) re-check the heavy spot by turning the wheel up 90 degrees on one side, then 90 degrees up on the other side, to make sure that the spot was correctly determined and marked; (4) draw a horizontal line through the axis of the wheel; (5) insert the two weights above this line; (6) after the wheel has come to rest, again locate the heavy spot; (7) if it's at the same point as before, move the two weights closer together towards the top; (8) if, on the other hand, the heavy spot is now opposite to where it was originally, move the two weights farther apart toward the horizontal line; (9) repeat this procedure in degree until the wheel is properly balanced; (10) if, as in number 7 (above) the weights are moved up until they touch each other and the heavy spot is still at the bottom, either a third or fourth weight must be added or the wheel may be said to be too far out-of-balance to permit correction in the normal manner.

If the wheel arbor is provided with four weights, put the weights in their groove so that they are approximately 90 degrees apart. Then follow the same procedure as above, except that if the two top weights when moved closer together do not bring about the proper balance, follow by moving the bottom weights *up* toward the horizontal line, and vice versa, as the case may call for.

35 Q. *"Sometime ago on your recommendation, we tried your 8A-80-J-13-V-18 wheel for regrinding small drills and we are very pleased with its performance. What would you recommend for our large stand grinders for regrinding our larger drills and general work around the plant. Some of these stands use a 10" diameter wheel and some 12" diameter."*

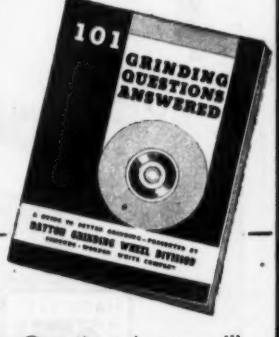
A. For regrinding your larger drills and general grinding jobs, we recommend our A 46-N-15-V-25 (old marking 46 N-1) for use on one end of your grinder. For the other end, we recommend our A36-0-15-V-30 (old marking 36-0-1).

36 Q. *"In surface grinding, is there any particular rule which determines the width of wheel to use?"*

A. The width of wheel recommended by the machine manufacturer is usually, if not always, the best size to use. If occasion demands, a narrower wheel can be used, but never, under any circumstances, should a wider wheel be used. To do so, is to invite almost certain trouble because of the increased strain which is put on the motor, bearings, etc.

READY NOW...a guide to better grinding!

101 "Answers" to everyday grinding problems—indexed for quick, easy reference—will be sent FREE to anyone interested in better grinding practices. Just fill in and mail coupon below.
SIMONDS WORDEN WHITE CO., DAYTON 7, OHIO.



DAYTON GRINDING WHEELS

SIMONDS WORDEN WHITE CO.,
712 Negley Place, Dayton 7, Ohio

Please send me Free Booklet "101 Grinding Questions Answered"

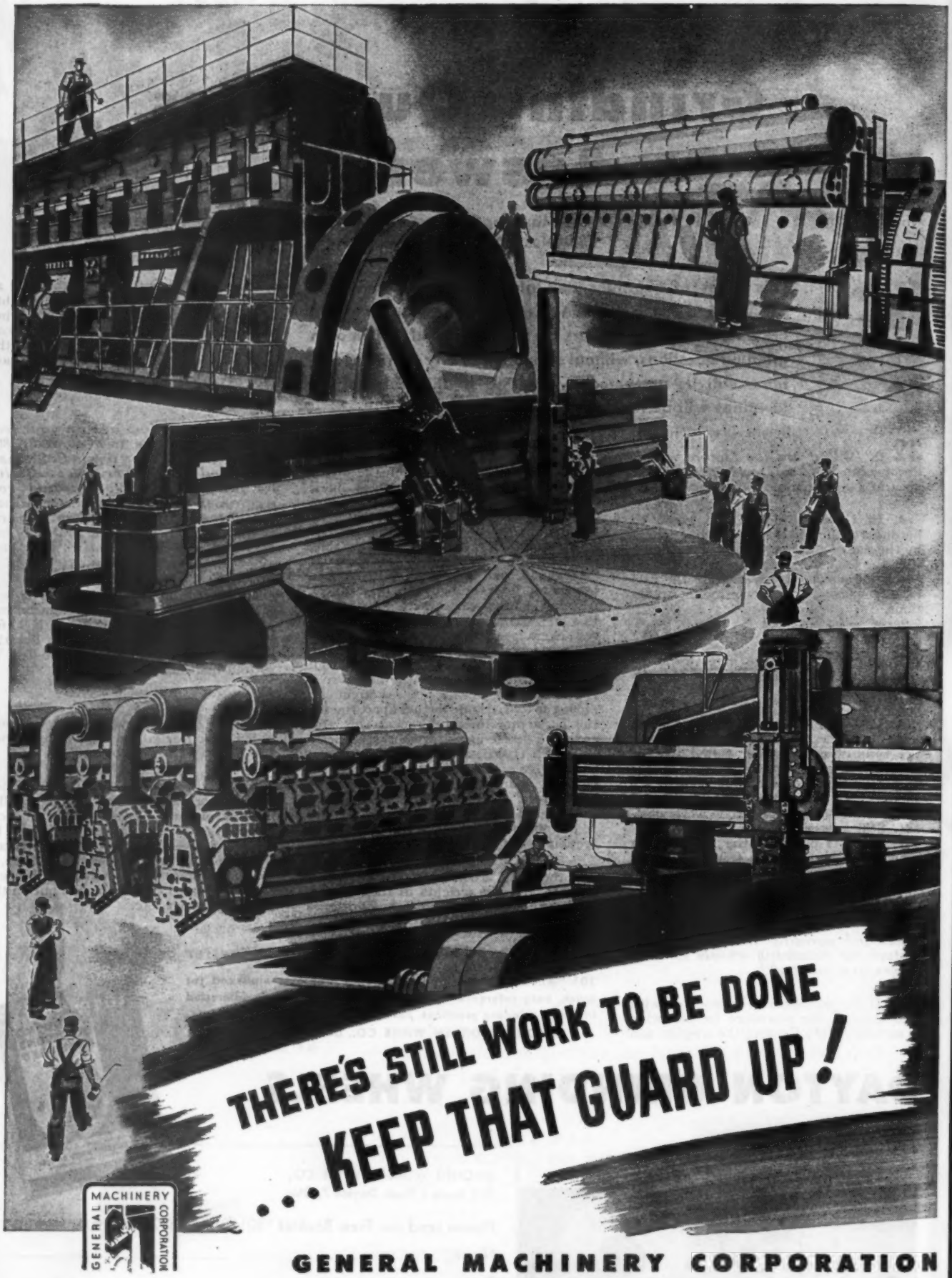
Name_____

Firm_____

Address_____

City_____ Zone_____ State_____

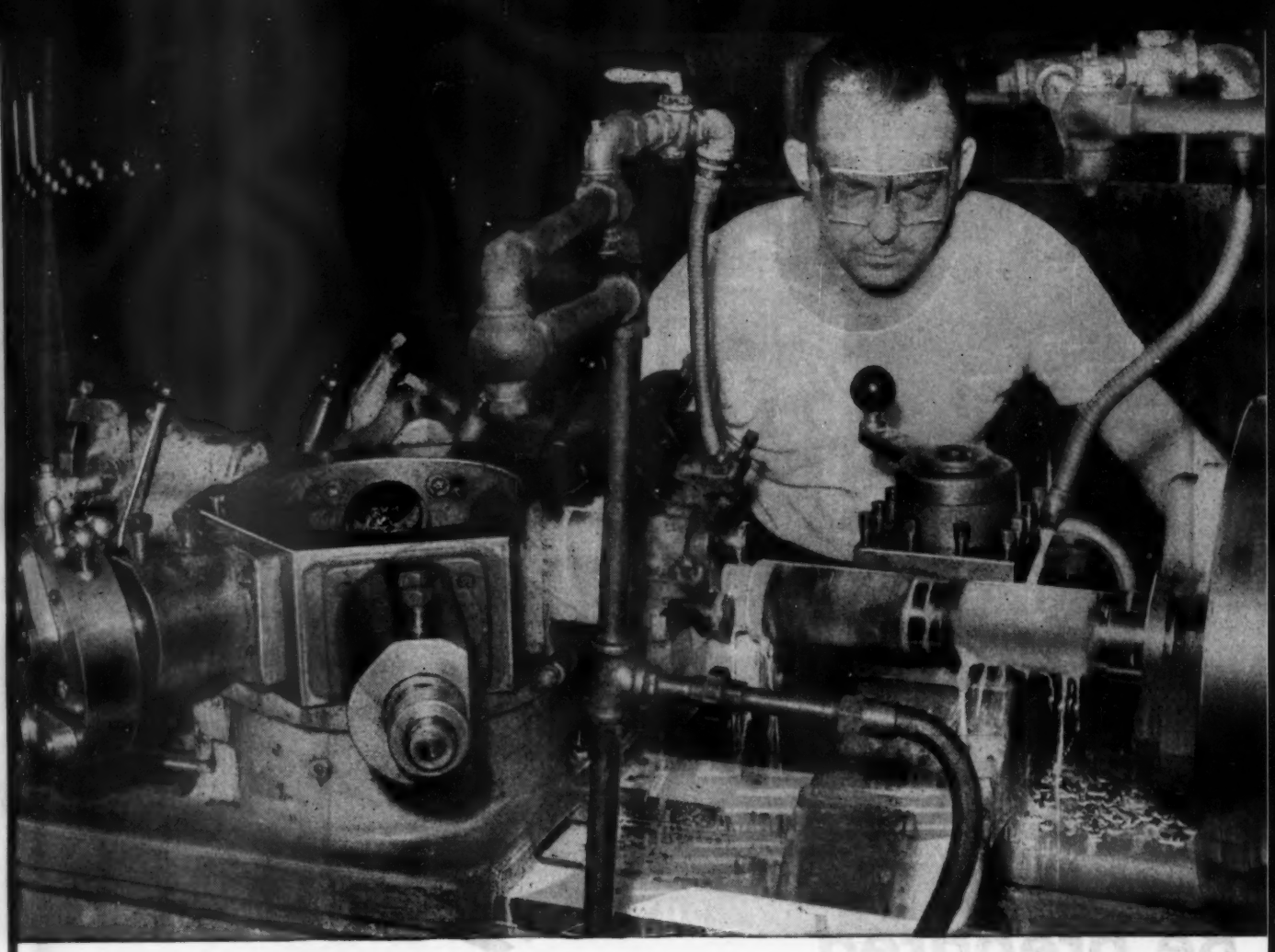
COPYRIGHT 1945, SIMONDS WORDEN WHITE CO.



GENERAL MACHINERY CORPORATION

HAMILTON, OHIO

THE NILES TOOL WORKS COMPANY • THE HOOVEN, OWENS, RENTSCHLER CO. • GENERAL MACHINERY ORDNANCE CORPORATION



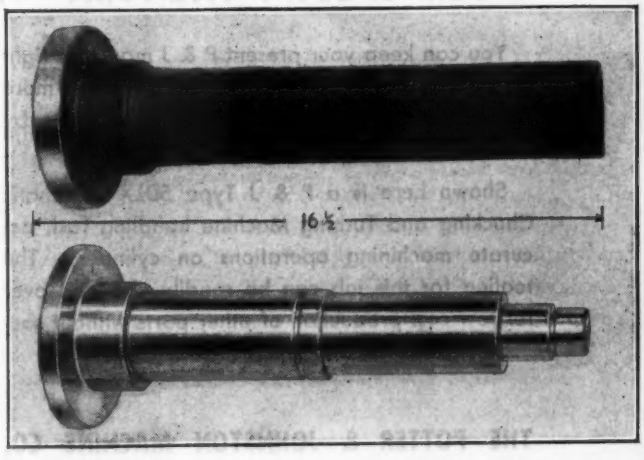
Soften Up YOUR TOUGH MACHINING JOBS *with Gisholt Power and Rigidity*

When the cuts are heavy and the going is hard, you can count on these Gisholt qualities to show up.

You have the power to begin with—all you'll ever need—transmitted smoothly through alloy steel gears, heat-treated and precision finished. With the husky spindle supported at both ends by double tapered roller bearings, you have a 12-speed change of pace to answer every need, from the highest speed to the heaviest pull without chatter or vibration.

And here's greater rigidity, too, assured by Gisholt's one-piece bed and headstock, which is cast integrally of nickel semi-steel and heavily ribbed. Bed ways and cross slides are of hardened steel. Thus, the thrust of every working tool is always borne by a surface of hardened steel.

When you are making heavier than usual cuts, or machining harder than average steels, Gisholt power and rigidity make a big difference. You can prove it.



Instead of machining them "soft," these forged steel countershafts are heat-treated to 270 Brinell before *machining on this Gisholt 2-L Saddle Type Turret Lathe. Using standard tools and taking multiple cuts, they are completed in 8 minutes, floor to floor, ready for grind. Complete information is available in Production Bulletin No. 1. Write for it.*

GISHOLT MACHINE COMPANY

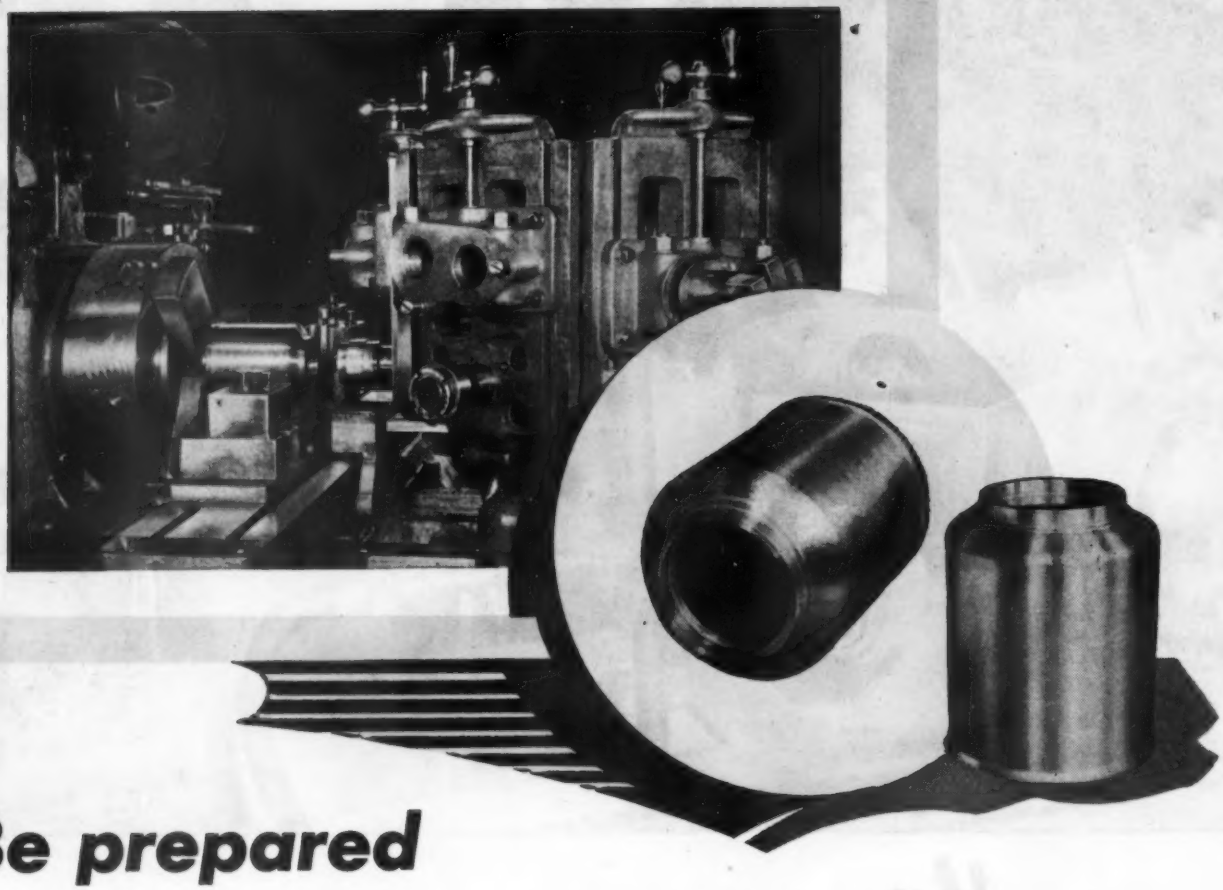
10 East Washington Ave. • Madison 3, Wis.

Look Ahead . . . Keep Ahead : : :

With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES



Be prepared for Peace... BY RE-TOOLING YOUR P & J AUTOMATICS—NOW!

YOU SPECIFY THE PART—P & J WILL DESIGN THE SET-UP

You can keep your present P & J machines right on the job when peace comes and get many more years of useful, profitable service from them by having them changed over for other work.

Shown here is a P & J Type 5DLX Automatic Chucking and Turning Machine handling fast, accurate machining operations on cylinders. The tooling for this job can be readily changed over for low cost production of other parts without sacrificing the speed, convenience and record-making productive performance inherent in all P & J equipment.

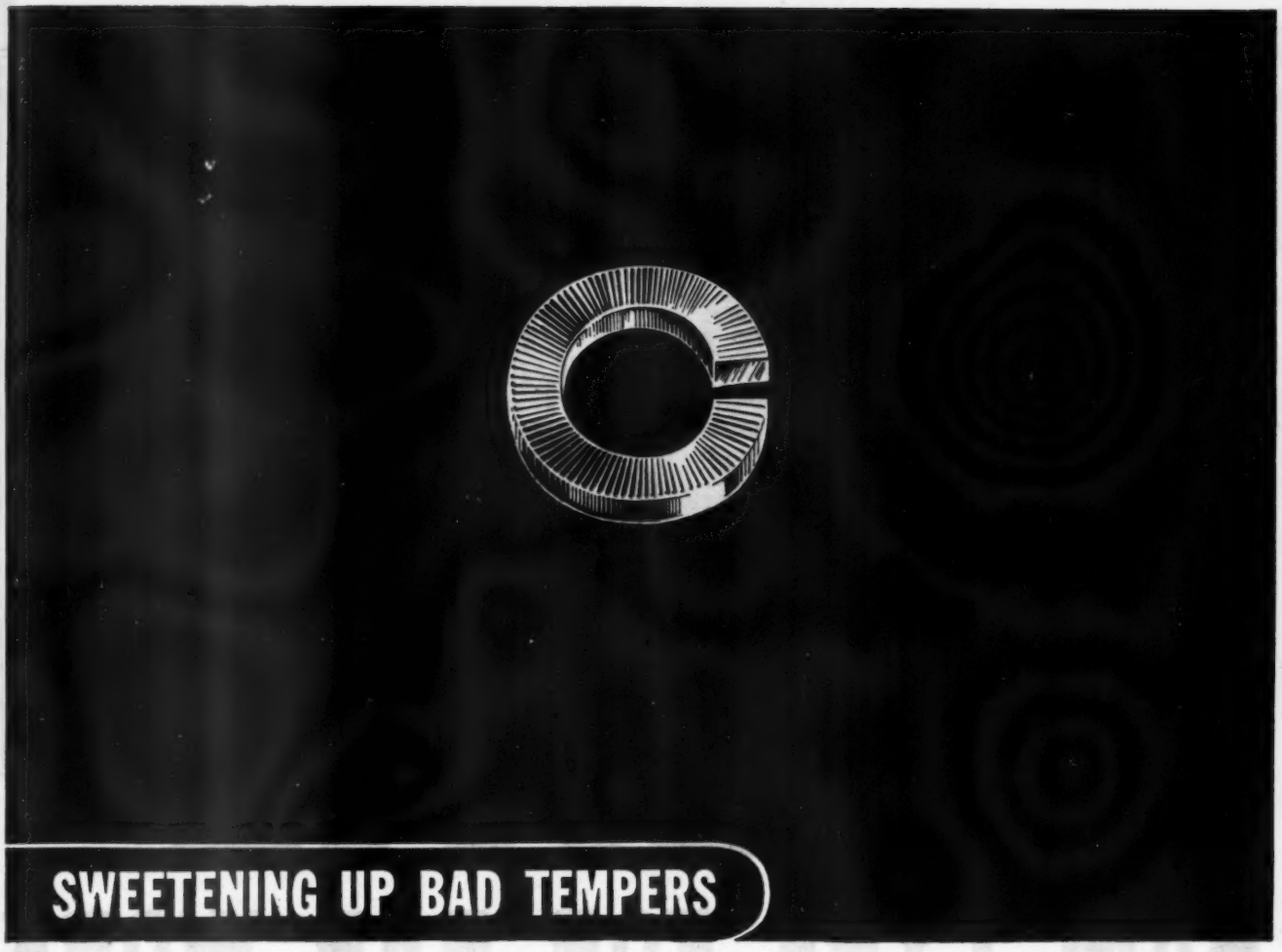
P & J Re-tooling offers users of P & J equipment the means of making the changeover quickly so that machines will be back on the production line in shortest possible time. It will be to your advantage to consult our engineers immediately on your reconversion problems.

THE POTTER & JOHNSTON MACHINE CO.
Pawtucket, R. I.

A BOND is a good buy for you and a "GOOD-BYE" to tyrants

P & J Rebuilding Service

P & J offers complete facilities for thoroughly rebuilding customers' P & J Automatics in our shop and restoring them to original productivity and accuracy. Re-tooling can also be handled at the same time.



SWEETENING UP BAD TEMPERS

Another result of industrial cooling

THE Puritans, they say, used ducking stools to cool off bad tempers. Not a bad idea . . .

Take steel lock washers. They have to be tough. To make 'em tough . . . real tough . . . and give 'em a good temper . . . they're heat-treated and then dunked in an oil quench.

But, trouble starts when the quenching oil gets overheated. Too-hot oil results in poorly tempered washers—costly rejects or *dis*satisfied customers.

And that's why G-E comes into the picture with the Evaporative Cooler . . . to keep the quench oil at the proper temperature . . . to assure uniform strength and temper in the finished product.

G-E Evaporative Coolers have a water-economy feature of especial interest in areas where water is scarce or expensive.

For example, the oil to quench ½ ton of steel washers an hour is kept cool with 60 gallons of water per hour. *Conventional methods of cooling this oil would require approximately fifty times as much.* In high-cost-water areas, this single saving will frequently pay for the equipment within a year.

G-E Evaporative Coolers are easy to clean and service . . . greatly reducing maintenance costs where water sources are impure—as most of them are. And in event of interrupted water supply, the unit's water reserve is sufficient to provide continuous cooling—often long enough to repair the stoppage—and prevent a production jam.

You may not be manufacturing lock washers. But the chances are that somewhere in your processing . . . in your plant . . . are applications where G-E's specialized industrial cooling, refrigeration, and air conditioning techniques will help develop better products . . . lower unit costs.

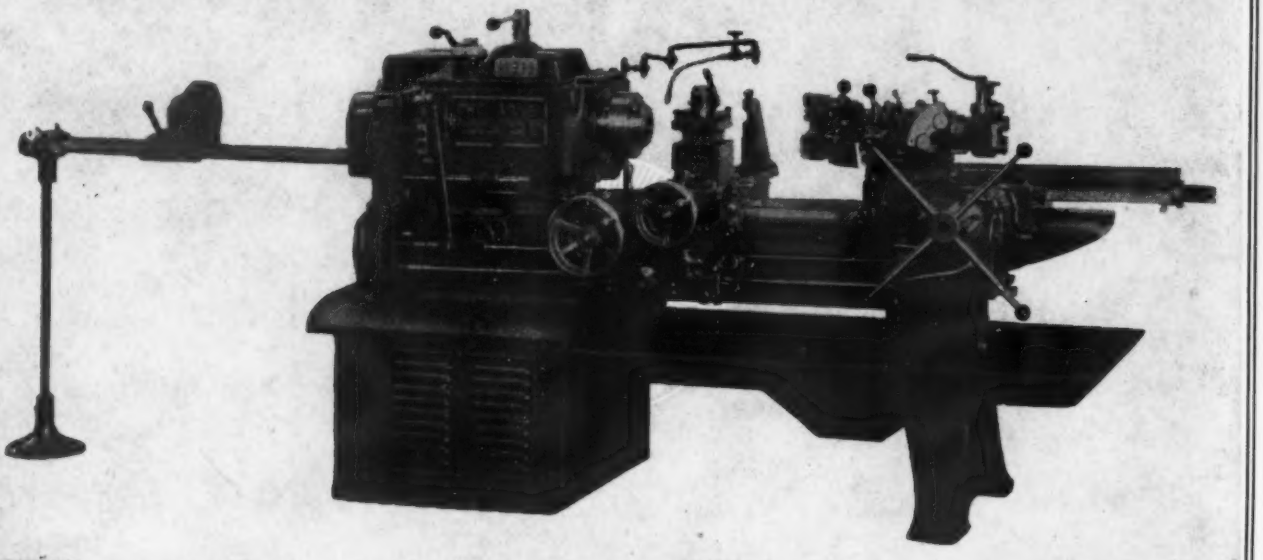
General Electric Company, Air Conditioning Department, Section 5697, Bloomfield, New Jersey.

BUY . . . and hold . . . WAR BONDS

GENERAL ELECTRIC

Industrial Refrigeration

Tune in: The "G-E HOUSE PARTY," every afternoon, Monday through Friday, 4 p. m., E W T, C B S . . . The "G-E ALL-GIRL ORCHESTRA," Sundays, 10 p. m., E W T, N B C . . . "THE WORLD TODAY" News, Monday through Friday, 6:45 p. m., E W T, C B S



ACME

RAM TYPE FOR BAR WORK

● This Acme Ram Type Turret Lathe is fitted with Automatic Chuck and screw bar feed. It is also equipped with chasing attachment for cutting from 4 to 32 threads per inch. This attachment is extra and furnished only when required.

This type machine will accommodate round bar stock up to 2" on the No. 5R machine, and up to 2½" round stock on the No. 6R machine.

All of the most important features necessary to maintain accuracy and speed at low cost are incorporated in this design which includes:

Hardened steel vees on bed.
Hardened steel ram slide bearings.
Triple roller spindle bearings.
Twin nut back lash eliminator on cross screw.
Non-overhanging headstock.
Side carriage apron taper gibed to front bearing on bed.
Independent feed ranges for either apron.

These are only a few of the many features.

For further details, or if you have any problems on bar or chucking work, feel free to contact us.

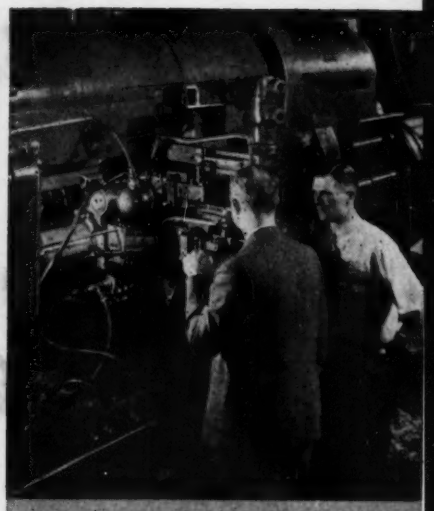
...The ACME MACHINE TOOL CO.
...CINCINNATI 32, OHIO.

AIRCRAFT PARTS PLANT

By increasing production 10% and tool life over 50%, Gulf Cut-Aid proved superior to 12 other brands of cutting oil for straddle milling aluminum alloy supercharger impellers.

AIRCRAFT ENGINE PLANT

Gulf Lasupar Cutting Oil helped the operating men of this plant increase production 15% and tool life over 100% in drilling master connecting rods for aircraft engines.



SHELL PLANT

When the proper Gulf Cutting Oil was put in service on this big automatic, rejects were greatly reduced, tool life was increased, and bearing trouble was eliminated.

You can rely on

GULF QUALITY PETROLEUM PRODUCTS

to help increase output and reduce costs in your plant, too!

THESE THREE CASES are typical of the war-job performance of Gulf industrial oils and greases!

Increased production, less bearing wear, longer tool life, better finishes on machined parts, improved rust prevention, lower maintenance costs—benefits like these from the use of Gulf quality products are reported every day by plant operating men from Maine to New Mexico.

When you are planning ways and means to increase production and reduce costs during the critical months ahead, ask yourself this important question: "Are we getting all the benefits that can be obtained through modern petroleum science and lubrication practice?"

For effective help in reducing your maintenance costs and increasing operating efficiency, call in a Gulf Service Engineer today. He will co-operate with you to give your plant the advantage of the many recent time- and money-saving developments of Gulf technologists. Write, wire, or phone your nearest Gulf office.

GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

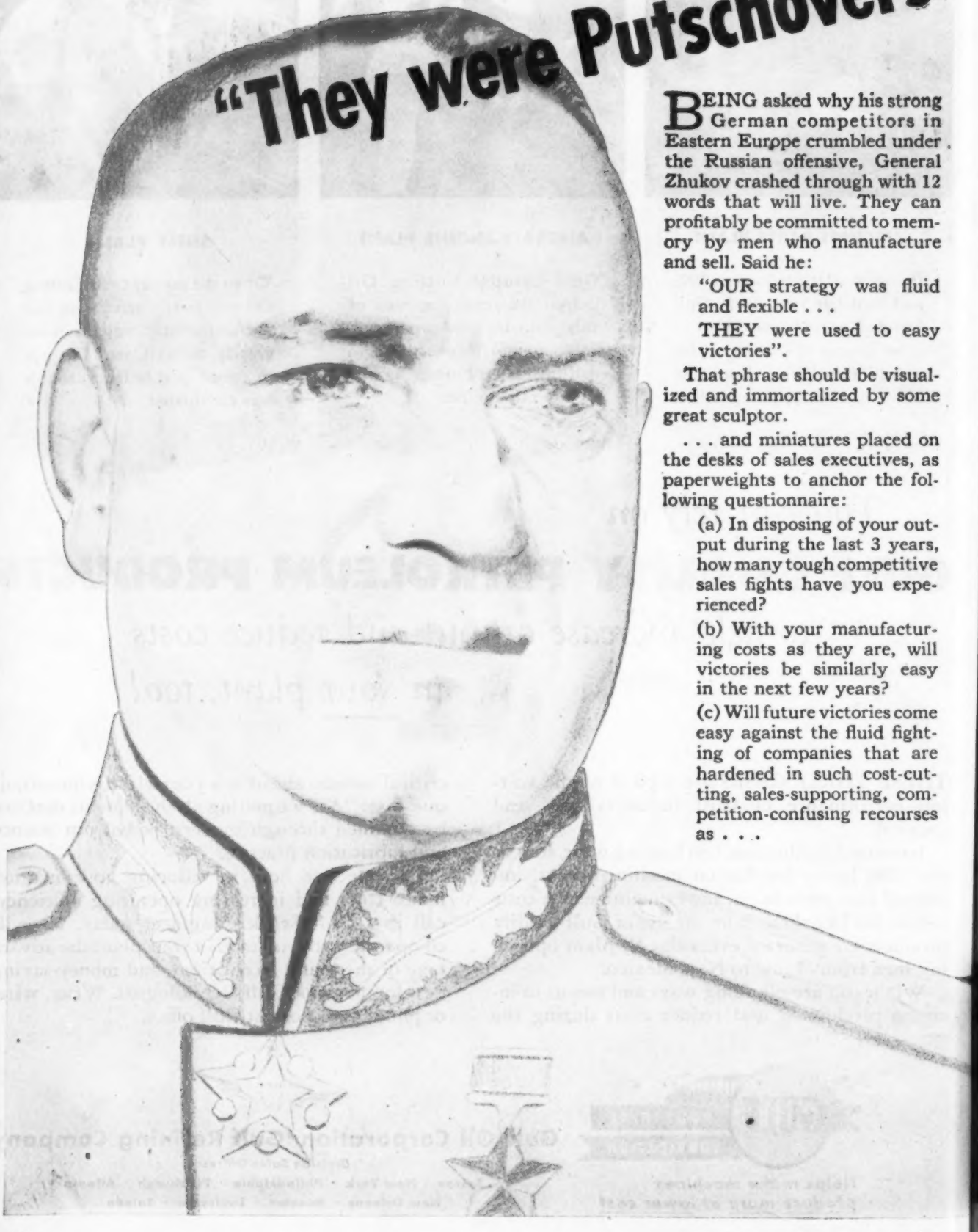
Gulf Oil Corporation • Gulf Refining Company

Division Sales Offices:

Boston • New York • Philadelphia • Pittsburgh • Atlanta
New Orleans • Houston • Louisville • Toledo

then he said to himself

"They were Putschovers"



BEING asked why his strong German competitors in Eastern Europe crumbled under the Russian offensive, General Zhukov crashed through with 12 words that will live. They can profitably be committed to memory by men who manufacture and sell. Said he:

"OUR strategy was fluid and flexible . . .

THEY were used to easy victories".

That phrase should be visualized and immortalized by some great sculptor.

. . . and miniatures placed on the desks of sales executives, as paperweights to anchor the following questionnaire:

(a) In disposing of your output during the last 3 years, how many tough competitive sales fights have you experienced?

(b) With your manufacturing costs as they are, will victories be similarly easy in the next few years?

(c) Will future victories come easy against the fluid fighting of companies that are hardened in such cost-cutting, sales-supporting, competition-confusing recourses as . . .

"Fluid and Flexible"...*he says*

THAT, ZHUKOV, is also the battle cry of manufacturers using Arc Welding to win business victories.

WHEN THE SALES DEPT. SAYS:

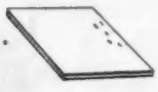
"We've got to trim the cost of our product or get trimmed in the field."

THEN THE SHOP DEPT. SHOULD REPLY:

"O.K., let's go after parts such as this 95¢ cab support—

1. Cut a plate and bend into a channel so . . .

2. Cut a base plate so . . .



3. Cut 3 braces so . . .

4. Use a stud so . . .

5. Assemble the parts in a jig and weld

Total cost of welded steel support, 52¢ . . .

SAVING **43¢** each."

Photos and data courtesy of Autocar Company

The Lincoln Engineer nearby will gladly help you develop your strategy along the fluid and flexible lines of welded design. Studies in Machine Design free on request. Ask for them on your business letterhead.

THE LINCOLN ELECTRIC COMPANY • Dept. I-1, Cleveland 1, Ohio

America's greatest natural **recourse**

ARC WELDING

holes WITH PRECISION

Economax Radials are manufactured by The Fosdick Machine Tool Company, Cincinnati, Ohio.

Holes are important when precision depends upon them—as it does in the case of the holes these two Economax 5' 7" Hydraulic Radials are drilling.

These machines are installed in the plant of the Kearney & Trecker Corp., Milwaukee, Wis., leading manufacturer of precision milling machines. It's a case of one precision product helping to create another, for the Economax Radials are equipped with 15 Timken Tapered Roller Bearings each—9 in the head gearing assembly and 6 in the motor gear box.

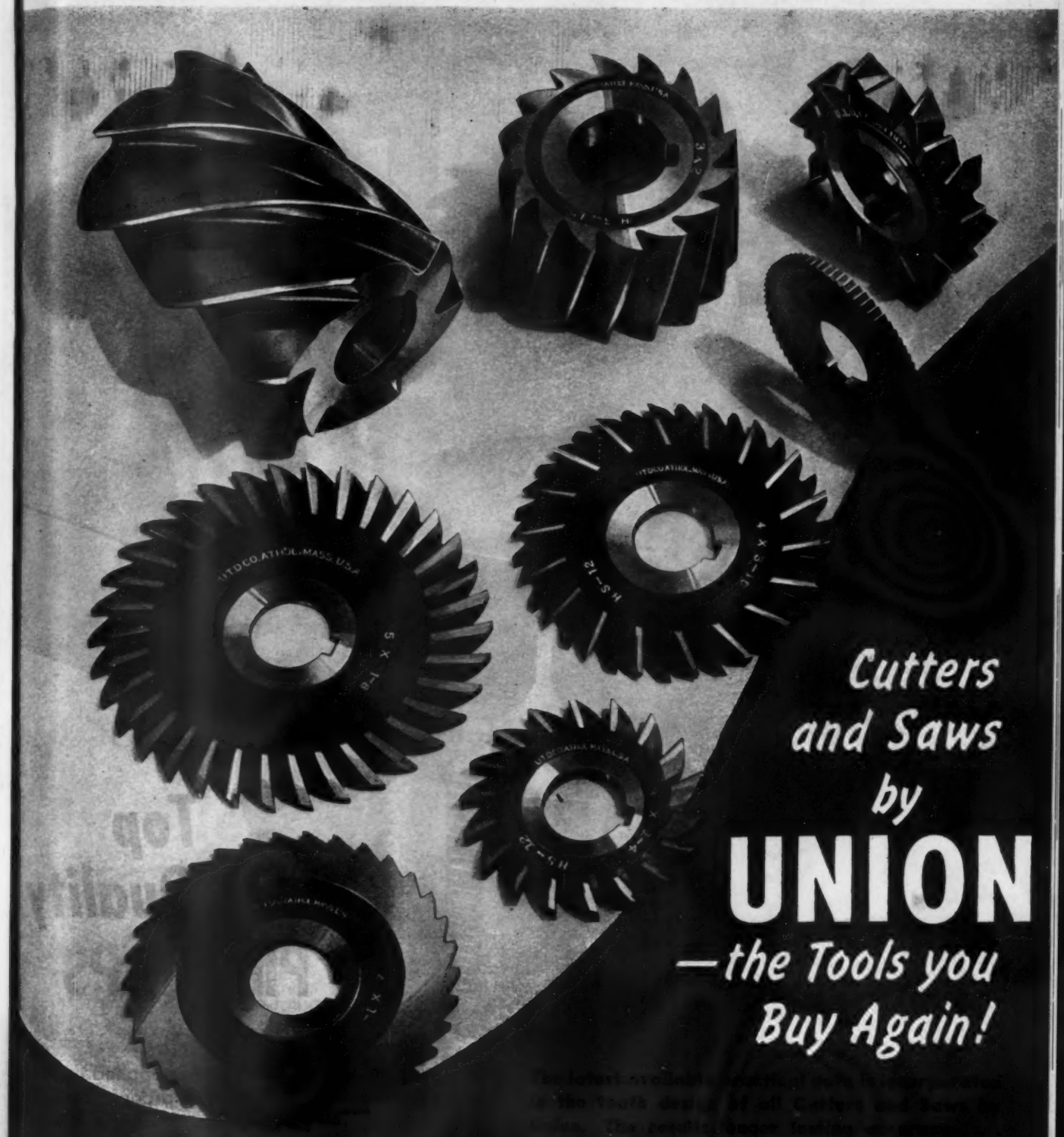
The presence of these Timken Bearings means that vital shafts and gears are permanently protected against friction; wear; radial, thrust and combined loads and misalignment, so that close working tolerances can be maintained under any condition of speed and load within the machine's scope.

Incidentally, Timken Bearings are important factors of precision in Kearney & Trecker milling machines—and have been for years. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

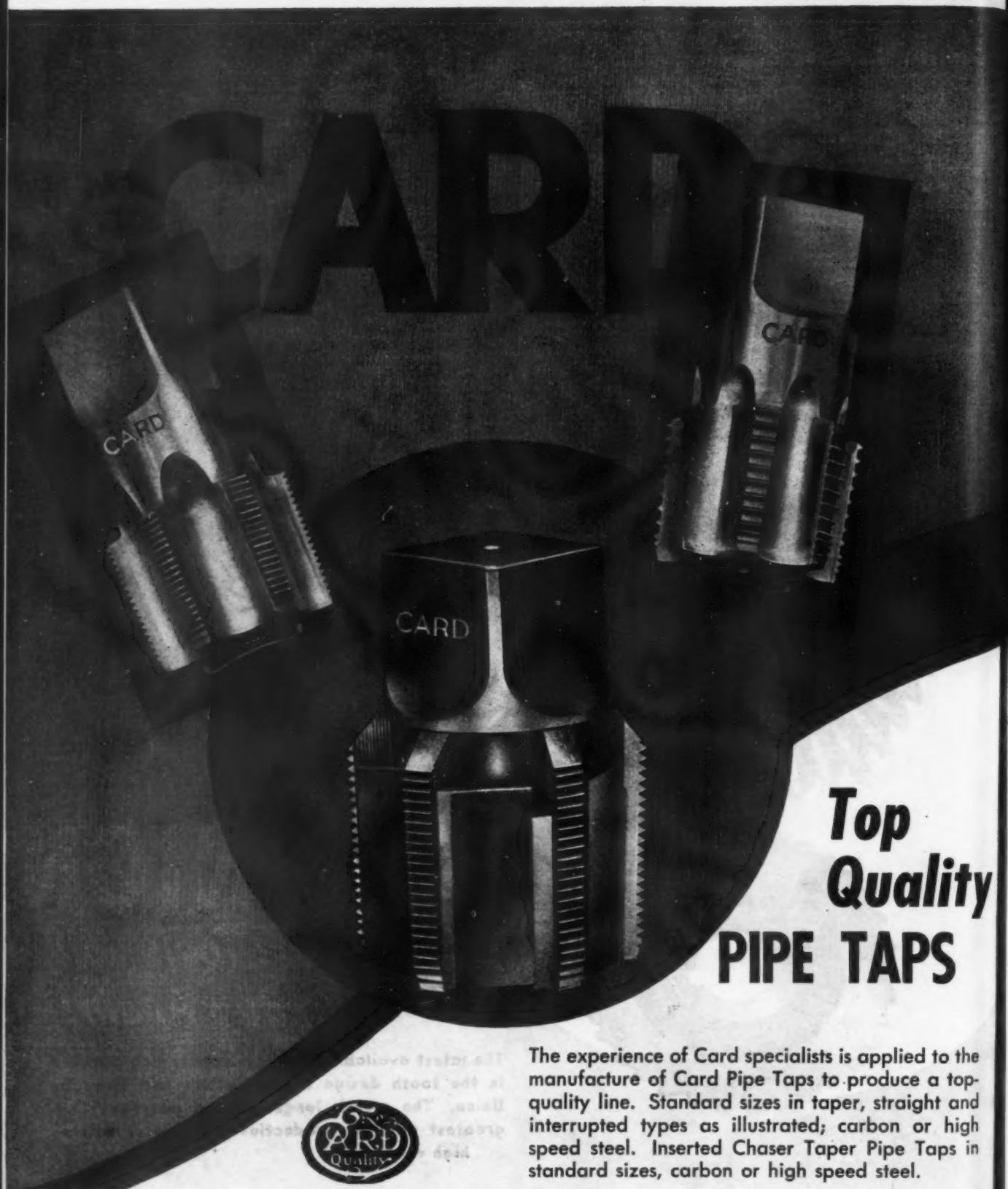
TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



Union Twist Drill Co., Athol, Mass.

UNION ★ BUTTERFIELD ★ CARD Divisions of the Union Twist Drill Company



Top Quality PIPE TAPS

The experience of Card specialists is applied to the manufacture of Card Pipe Taps to produce a top-quality line. Standard sizes in taper, straight and interrupted types as illustrated; carbon or high speed steel. Inserted Chaser Taper Pipe Taps in standard sizes, carbon or high speed steel.

S. W. CARD MFG. CO.
MANSFIELD, MASS.

STORES
NEW YORK: 61 READE ST.
CHICAGO: 11 SO. CLINTON ST.
DETROIT: 5527 WOODWARD AVE.
SAN FRANCISCO: 121 SECOND ST.
LOS ANGELES: 524 E. FOURTH ST.
SEATTLE: 568 FIRST AVE., SOUTH

UNION ★ BUTTERFIELD ★ CARD

Excellent PERFORMANCE with Butterfields!

The name Butterfield is famous for Taps. Whether the tools are standard hand taps or (illustrated) a variety of Nut and Tapper Taps, you may expect superb quality in materials, workmanship, accuracy and performance.

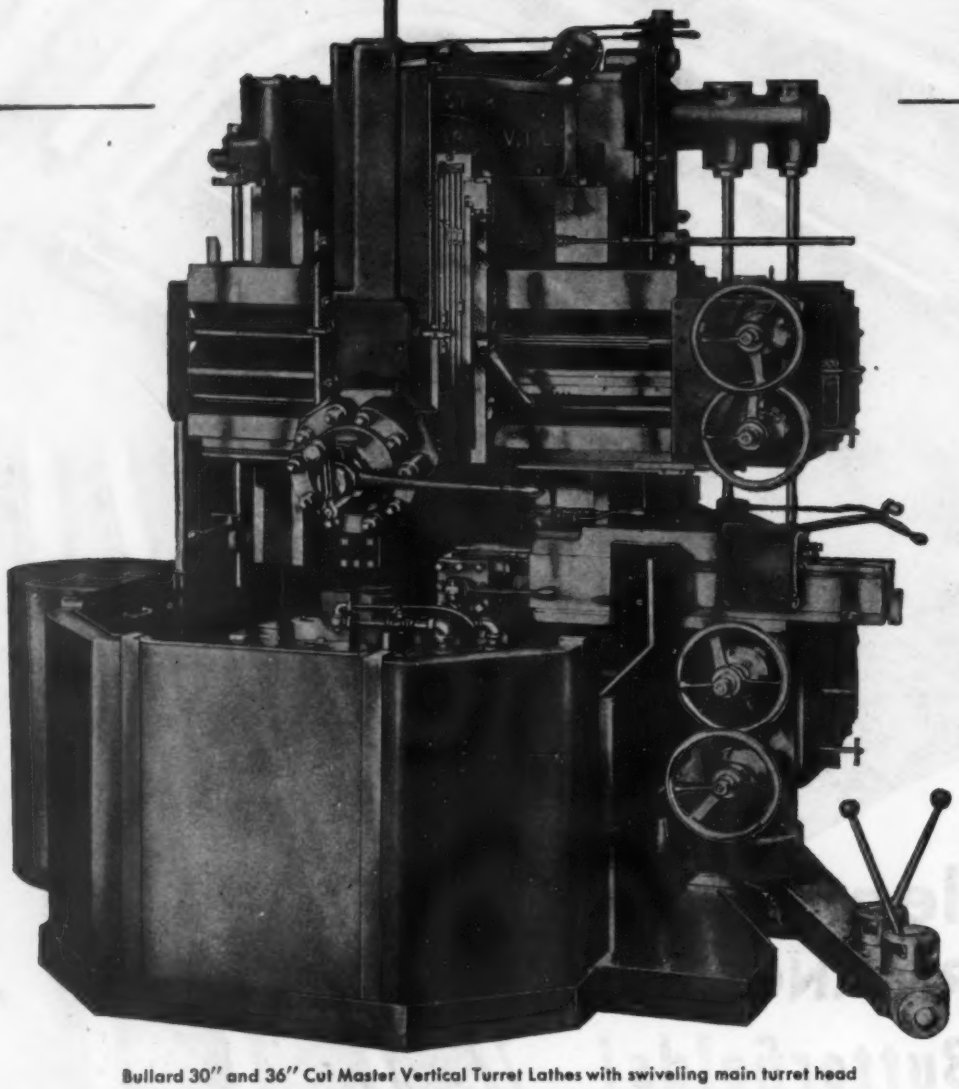
STORES: New York, 61 Reade St.—Chicago, 11 So. Clinton St. — Cleveland 15, Hal W. Reynolds, 2902 Euclid Ave. — Detroit, 5527 Woodward Ave. — Los Angeles, 524 E. Fourth St.—Toronto, 137 Wellington St., West—Montreal, 111 St. Paul St., West—Winnipeg, Man., David Philip Agencies Limited, 212 Bannatyne Ave.—Vancouver, 327 Shelly Bldg. Agents for Great Britain: Charles Churchill & Co., Ltd., 27-34 Walnut Tree Walk, Kennington, London, S.E. 11, England. Branches at Birmingham, Manchester, Glasgow, Newcastle-on-Tyne and Bristol.

BUTTERFIELD DIVISION, Derby Line, Vt., Rock Island, Que.

Divisions of the Union Twist Drill Company

MAKES EVERY MINUTE COUNT

. . . *in cost reduction*



Bullard 30" and 36" Cut Master Vertical Turret Lathes with swiveling main turret head and non-swiveling side head. 16 feeds for each head in geometrical progression from .0026 to .500 per work spindle revolution. 20 table speeds. Larger machines in 42", 54", 64" and 74" sizes, with choice of six different head combinations.

Lower machining cost is a natural for every minute of operation of Bullard Cut Master Vertical Turret Lathes. That is because Bullard Cut Masters are designed and built to cut time *on* cuts and *between* cuts.

Screw feeds of main heads assure a high degree of machining accuracy.

Heavy, rigid construction plus H.P. rating and range of feeds and speeds adequate for the fastest cutting tools assure rapid machining with maintained accuracy under the heaviest cutting.

Heavy simultaneous cutting with both heads, easy chucking, conveniently located controls and quick-reading micrometer dials add to the productive ability of every operator.

Cut Master's metal-removing ability shortens machining time.

For complete description of the cost-cutting features of Bullard Cut Master Vertical Turret Lathes, write today, specifying the size that interests you. The Bullard Company, Bridgeport 2, Connecticut.

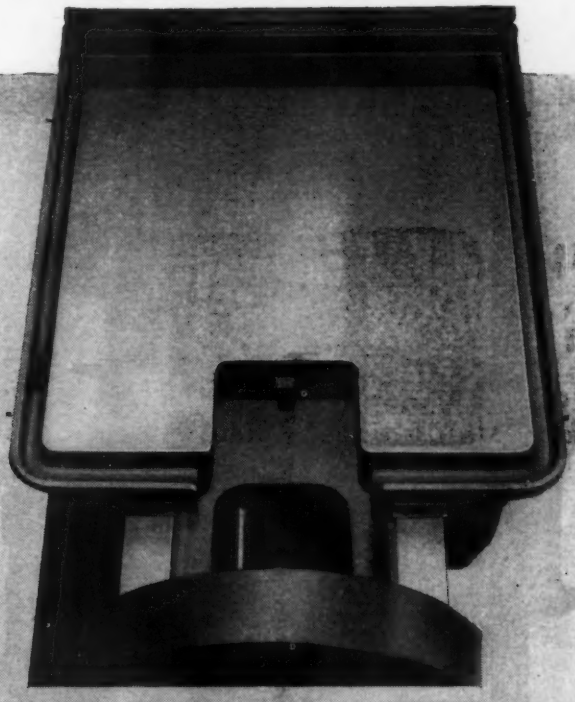
From Government Machine Tool Surplus Lists, select the better machines to replace obsolete models you've been using on non-critical operations. Ask Bullard for information on these models by machine number.

BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

HERE'S WHY WE CALL IT *The* SIMPLIMATIC

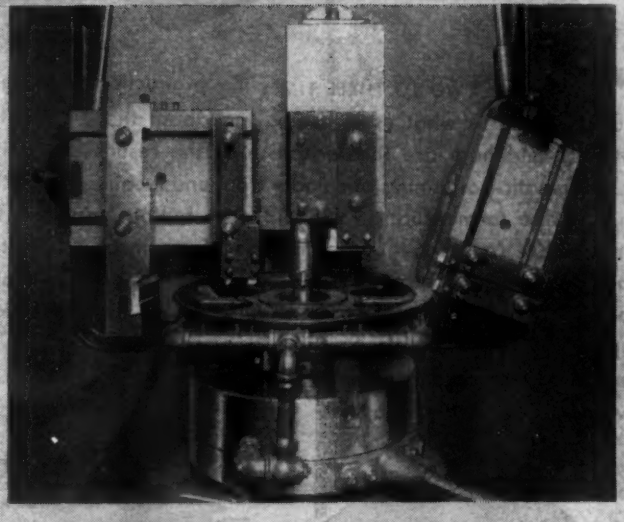


Its simplicity starts with this first basic idea: The use of this large horizontal table which makes it possible to place every tool in its most favorable working position. Here, a greater number of slides can be used. A greater variety of positions is possible. Angle feeds are no problem. Compound slides are unnecessary.

Tool set-up is simpler and more effective. With each slide individually cammed, all slides are independent of each other as to approach, order of engagement with work, rate of feed, dwell, and retract.

Only one simple lever is required to control the complete cycle of machining operations. It doesn't take skill to keep this automatic lathe turning out work swiftly and within the limits.

"SIMPLIMATIC" really describes this simple automatic lathe. If you have parts in volumes to justify its use, get all the facts about it. Write for literature.



With this typical Simplimatic tool set-up, turning and shaving the tapered outside diameter, boring, facing, grooving and chamfering are done simultaneously, in one operation. Tools are quickly and easily adjusted for a variety of sizes.

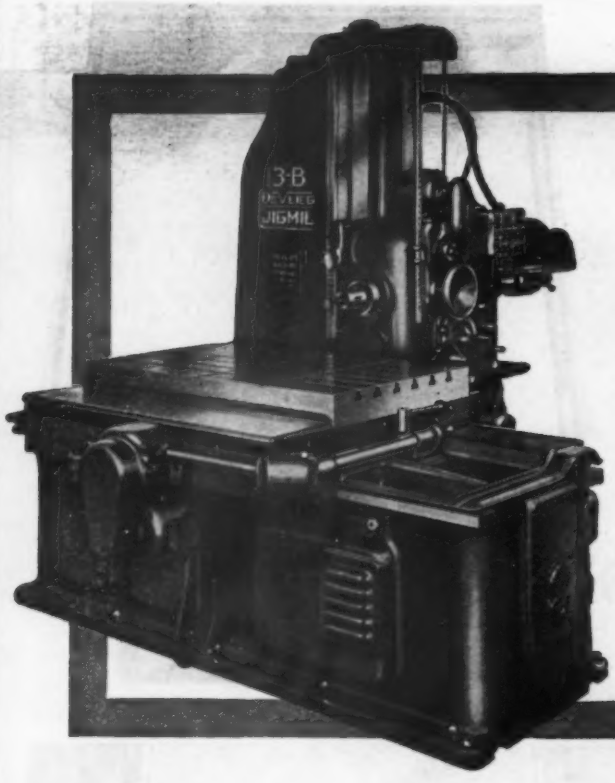
GISHOLT MACHINE COMPANY

1201 East Washington Ave. • Madison 3, Wis.

GISHOLT

Look Ahead . . .
Keep Ahead . . .
With Gisholt Improvements in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES



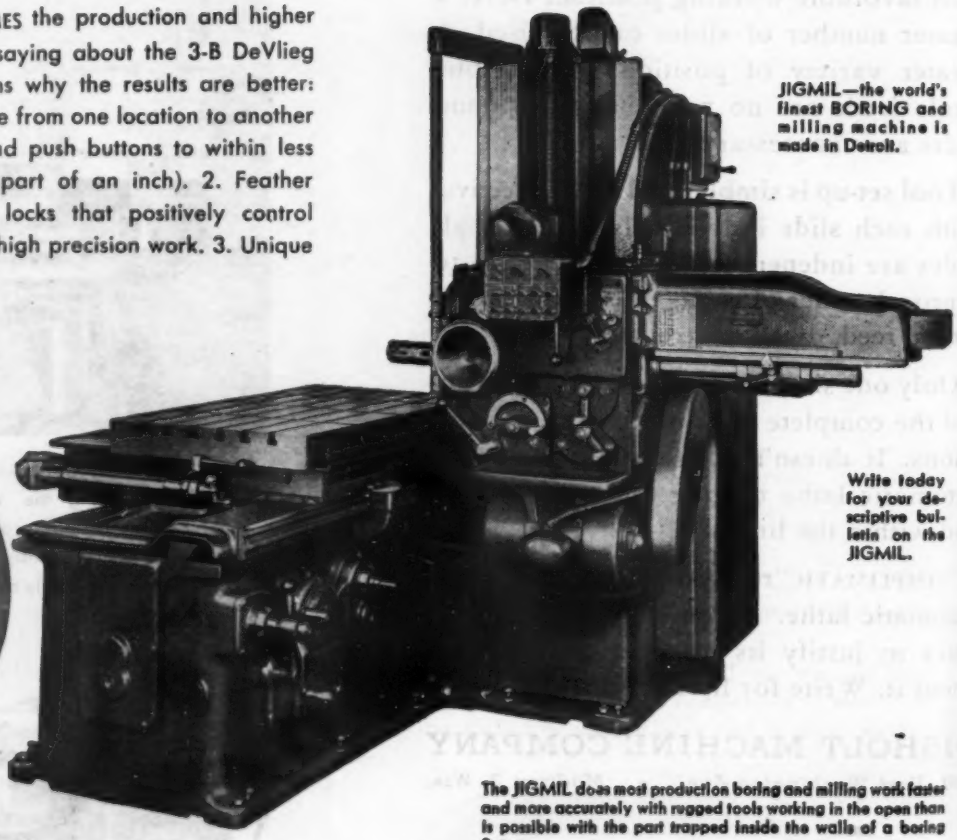
★

The JIGMIL has proven to be a totally new approach to the problems of economical precision BORING and milling . . .

★

"TWO TO THREE TIMES the production and higher quality work" is what users are saying about the 3-B DeVlieg JIGMIL—and here are the reasons why the results are better: 1. Automatic positioning of spindle from one location to another in response to measuring rods and push buttons to within less than .0001 (one ten-thousandth part of an inch). 2. Feather touch, pressure controlled slide locks that positively control locking uniformity, so essential to high precision work. 3. Unique operation and controls that make possible high precision work with relatively little skill.

JIGMIL—the world's finest BORING and milling machine is made in Detroit.



Write today for your descriptive bulletin on the JIGMIL.

The JIGMIL does most production boring and milling work faster and more accurately with rugged tools working in the open than is possible with the part trapped inside the walls of a boring fixture.

JIGMIL YOUR WORK

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

ELECTRONIC CONTROL OF FEED RATE

Thy-mo-trol drive operates the work feed on this Sundstrand-built "copy mill", which cut fin-milling time 35 per cent.

HELPS CUT FIN-MILLING TIME 35%

For one of the war's most vital machining jobs—aluminum cylinder heads for aircraft—the Sundstrand Machine Tool Company has developed a special machine which automatically mills fins on the walls of the forgings. Using this machine, a leading engine builder now completes these heads in 35 per cent less time than was required with a conventional feed drive.

Key to the increased production is optimum-speed machining, despite continual changes in depth of cut. G-E Thy-mo-trol drive gives precise control of feed motor speeds over a range from 175 to 1750 rpm. By means of its sensitive electronic control, it varies the feed rate automatically in inverse proportion to the load on the spindle motor. Light cuts go fast, deep cuts go slowly, and the fragile cutter required for this fin milling operation is kept loaded to the maximum safe working capacity.

Operated from an a-c power source, G-E Thy-mo-trol drive supplies closely controlled d-c power for stepless control of speed and torque over an unusually wide range. Thy-mo-trol drives are being "built-in" to all kinds of machines where power demands are between 1/8 and 25 hp. Grinders, milling machines, turret lathes, and thread mills are among the machine tools whose production has been stepped up by their use.

A co-ordinated set of equipment, Thy-mo-trol drive includes d-c motor, electronic panel, transformer, and control station. G-E engineers will help you select and apply Thy-mo-trol to your machines, or explore their suitability for new functions. Ask for Bulletin GEA-4025. *General Electric Co., Schenectady 5, N. Y.*

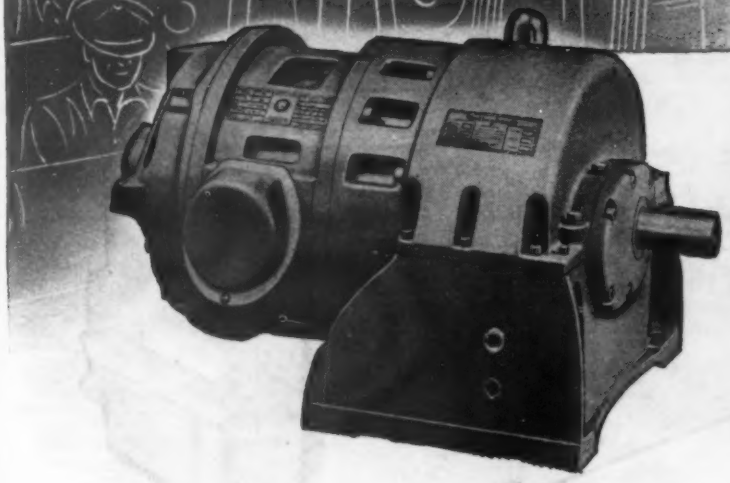
GENERAL ELECTRIC

Buy all the BONDS you can—*and keep all you buy*

THY-MO-TROL DRIVE

Modernize with "Packaged Drive"

Westinghouse GEARMOTORS and Speed Reducers



Save Space
Save Installation Time
Reduce Maintenance
Increase Safety
Improve Appearance

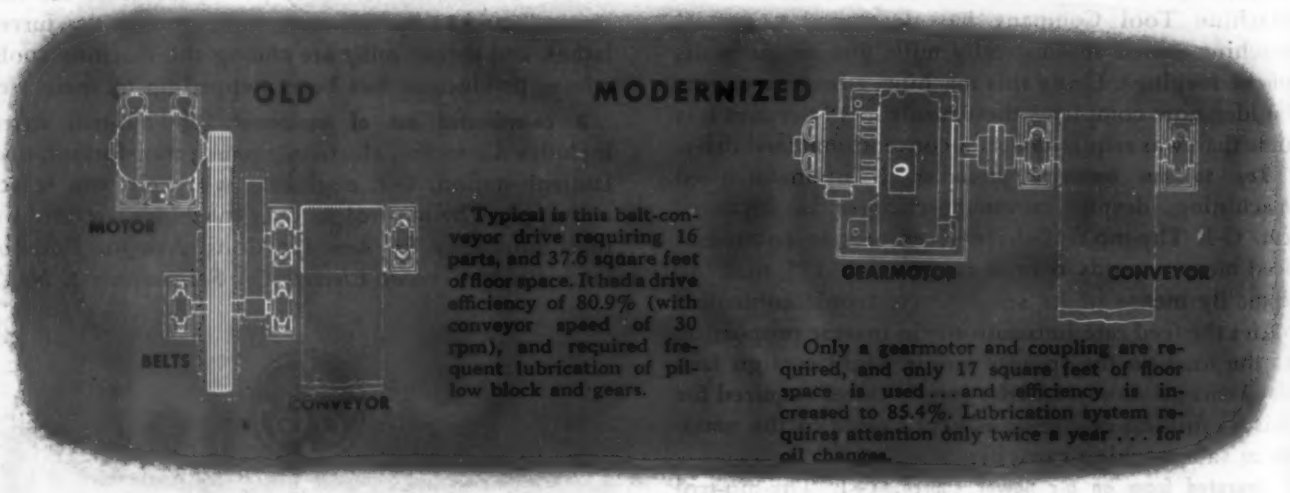
Gearmotors come complete in one "package"...ready for operation

Check up on your motor drives. Reconversion problems put a premium on their efficiency and economy.

Since the widespread use of gearmotors almost twenty years ago, performance records have proved them to be the most economical answer to drives which need speed reduction...and four out of every five drives do need speed reduction.

The efficiency of gearmotors stems from two major savings: (1) reduced power losses...no belts, ropes, and pulleys, etc.; (2) longer life and reduced outage time...maintenances seldom more than oil changes.

It's important, too, that your drives are engineered from one responsible source. When you come to Westinghouse you get undivided responsibility...the motor and gears are built by one manufacturer. Call your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-07231



Typical is this belt-conveyor drive requiring 16 parts, and 37.6 square feet of floor space. It had a drive efficiency of 80.9% (with conveyor speed of 30 rpm), and required frequent lubrication of pillow block and gears.

Only a gearmotor and coupling are required, and only 17 square feet of floor space is used...and efficiency is increased to 85.4%. Lubrication system requires attention only twice a year...for oil changes.

WESTINGHOUSE

Westinghouse

There is a Westinghouse speed reduction unit for most application needs

For Drives of 1 to 75 hp

Three types of Westinghouse Gearmotors—Type A, Type C, Type E furnish gear ratios from 1.22 to 58.3, available with single-phase, polyphase and direct-current motors.

HERE ARE 9 GOOD REASONS WHY YOU SHOULD INSTALL WESTINGHOUSE GEARMOTORS:

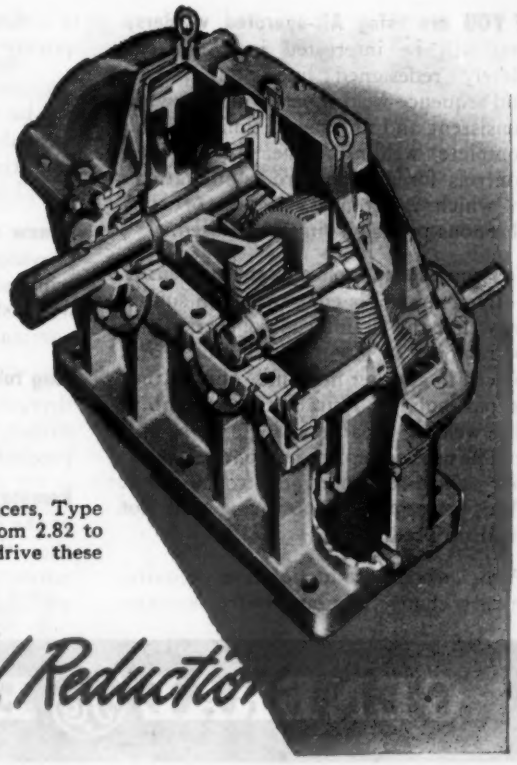
1. FEWER PARTS TO WEAR.
2. BPT "TOUGH-HARD" GEARS AND PINIONS.
3. USE ALL WESTINGHOUSE MOTOR TYPES.
4. HIGH EFFICIENCY.
5. POSITIVE LUBRICATION.
6. EASY ACCESSIBILITY.
7. IMPROVED FOUNDATION STABILITY.
8. MOTOR AND GEARS BUILT BY ONE MANUFACTURER.
9. DESIGNED AND APPLIED TO A.G.M.A. STANDARDS.

For Drives up to 1000 hp

Here are seven good reasons why you should install

Westinghouse Speed Reducers

- Antifriction bearings
- Simple, positive lubrication
- Heat-treated helical gearing
- Liberally proportioned gear cases assure alignment of rotating parts
- Low power loss for high efficiency
- Rugged case—split construction for easy accessibility
- Hob cutting assures high precision gears

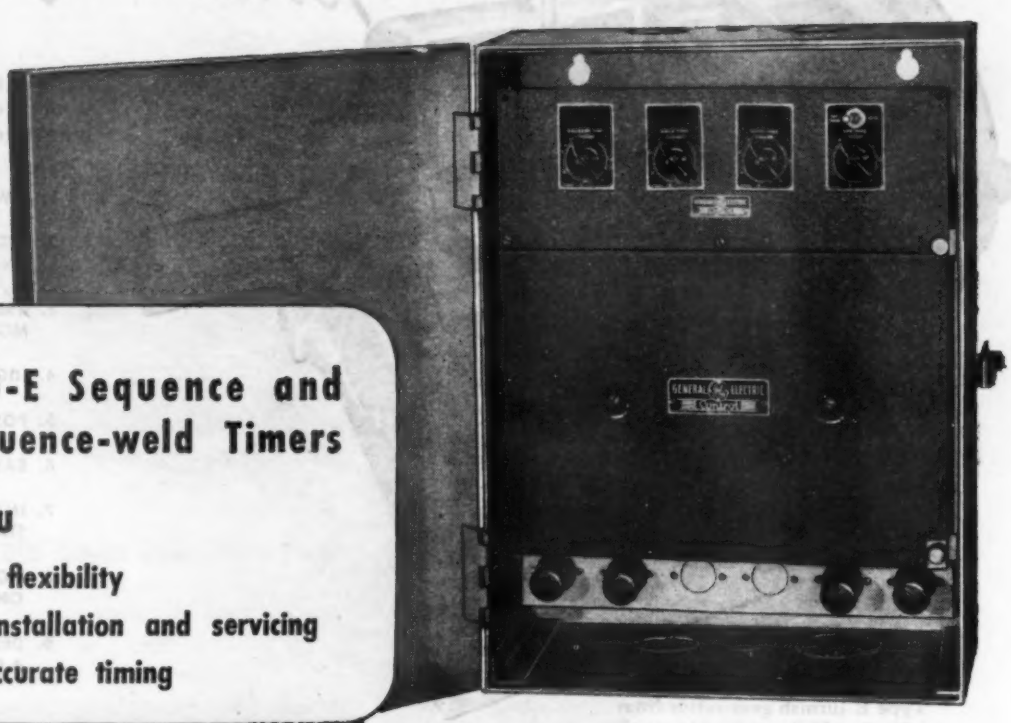


Two major types of Westinghouse Speed Reducers, Type SH and Type DH, offer speed reduction ratios from 2.82 to 70.5. Westinghouse also furnishes the motor to drive these units—for a complete installation.

4 out of 5 drives need Speed Reduction

Announcing

AN IMPROVED LINE OF TIMERS FOR RESISTANCE-WELDING MACHINES



now **G-E Sequence and Sequence-weld Timers**

Offer You

1. **Greater flexibility**
2. **Easier installation and servicing**
3. **More accurate timing**

A credit to your plant, this sequence-weld timer has been designed to meet the New American War Standards of Controls for Resistance Welding Machines (C52.4).

IF YOU are using Air-operated welders, you will be interested in this completely redesigned line of sequence and sequence-weld timers which provide consistent and automatic timing of the complete welding cycle. It includes controls for all standard combinations in which ignitron contactors or synchronous-precision timers are used.

You can change welding sequence easily—Each control is constructed in such a way that the timing control section can be removed in less than a minute—and placed in another machine. This feature is particularly desirable for assembly-line welding because a single spare unit can be used to replace any one of a number of similar timing control sections. And, consequently, servicing will not hold up production.

Also, when production-line requirements change, timing control sections of different types can be interchanged quickly without rewiring.

Because the timing control section can be removed easily (making readily accessible the terminal boards and mounting holes), installation of the complete timer is greatly simplified.

A new and more accurate timing circuit provides consistent welding speed as required for high production welding with short timing intervals, despite nominal variations in line voltage.

Long tube life—The new G-E metal thyratron tube, installed in the timing circuit, will keep this control operating precisely for a long time.

Remote operation—For the convenience of the operator in making adjustments, the timing-control station can be removed easily and mounted on the welding machine or elsewhere.

Built for Your Serviceman

These redesigned controls have many additional features which simplify routine inspection and servicing. Standard industrial-type relays, with which your electrician is familiar and which are easy to service, have been used throughout. Also, by redesigning the wiring system and mounting most of the small resistors and capacitors on a terminal board, servicing has been greatly facilitated.

Need More Information?

Your local G-E office will be glad to tell you more about the jobs that these controls can do—and are doing. Or write directly to us for more information. *General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

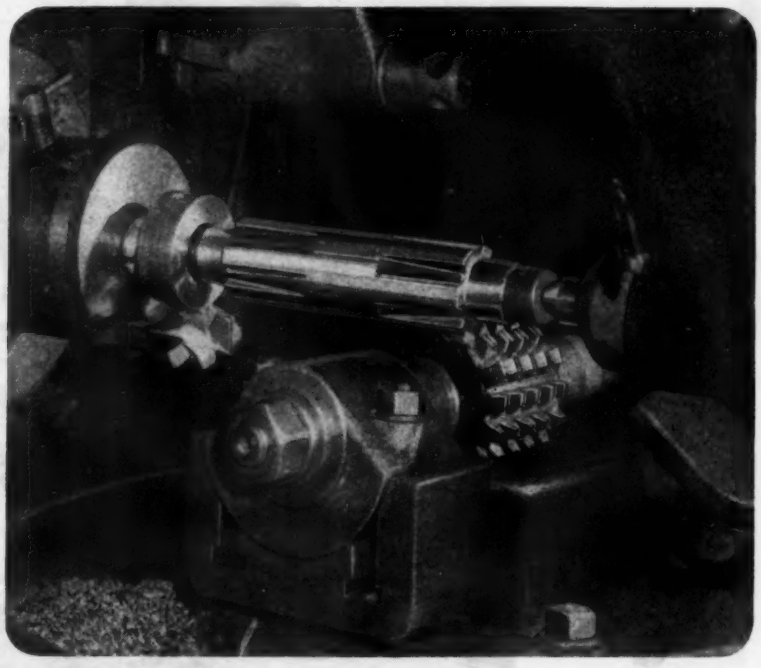
RESISTANCE-WELDING CONTROL

Buy all the Bonds you can—and *keep all you buy*

HOBBING TAPER SPLINES IN VERY HARD MATERIAL

Below, a close-up of the hobbing operation where a Barber-Colman Type "T" Hobbing Machine is cutting taper splines in steel of 375-430 Brinell.

Above, The Barber-Colman Taper Spline Hob and Spur Drive Shaft with taper splines hobbed on both ends.



. . . WITH THE

BARBER-COLMAN TYPE "T" HOBBING MACHINE

The Barber-Colman Type "T" Hobbing Machine is a highly accurate machine for all conventional types of hobbing as well as taper splines.

This double-end spur drive shaft is made of SAE 4620 steel, heat-treated to 375-430 Brinell, which is about the top range of hardness for hobbing. Even at that hardness, the Barber-Colman Type "T" Hobbing Machine is delivering good production, as it cuts the taper splines on both ends of the piece at the rate of 7 complete pieces per hour. Futhermore, the accuracy is held to close limits because the inspection method used is to assemble parts on both taper splined ends and the distance between these parts must fall within ±.0025" of a specified dimension. Also in spite of the hardness, the B-C Taper Spline Hob on this job has good tool life as it delivers 250 pieces per sharpening. Each taper spline section has 6 keys 1½" long, on a shaft O.D. of 1.893"/1.888", with a root dia. at the small end of 1.654"/1.652" and a key width of .497"/.495". The hob speed is 70 r. p. m. and feed is .055" per rev. of the work. *For jobs like this, where requirements are difficult, the Barber-Colman Type "T" Hobbing Machine may be the answer to your problem. Inquire about details. Ask for Bulletin No. F-1403.*

BARBER-COLMAN COMPANY

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U.S.A.

Check and Double Check

Insures Kobe Gage Quality

Each Kobe Gage you use has dependable accuracy because it has been individually checked—not once, but many times. From the first step in its making to the final laboratory analysis, it must continually pass rigid inspection tests.

Each Kobe Gage is designed to do its job with absolute accuracy. Spot checks or other short-cut inspection methods have no part in the Kobe procedure.

Starting with a qualitative inspection of the material, Kobe Gage control methods include individual dimensional inspections after each manufacturing operation and a final 100 per cent laboratory examination of each gage that carries the Kobe name.

During the war, Kobe has manufactured gages to the most difficult and exacting requirements of the Armed Forces. The same care in methods and procedures which has made this work successful is also followed in the making of Kobe standard and special gages for general industry.

The broad experience of Kobe engineers in gage craftsmanship is available to you in your reconversion problems. A letter to Kobe's Gage Division will bring a prompt response.

KOBE

ONE OF THE DRESSER INDUSTRIES

Master and Reference **GAGES**

KOBE, INCORPORATED

3040 East Slauson Avenue • Huntington Park, California

How to buy

SURPLUS MACHINE TOOLS

– and get value

Of course, we're talking about Acme-Gridley Multiple Spindle Automatics only—not trying to advise you on machines made by other manufacturers.

DON'T buy a used Acme-Gridley merely because it is offered to you at a cheap price.

DON'T buy a used machine without knowing its age, its capacity, and above all, its present condition.

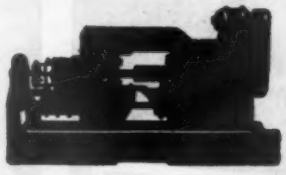
DO buy a used machine if you are sure that purchase price—plus its cost for whatever reconditioning and retooling may be necessary —totals less than the price of a new machine of equal capacity and performance.

REMEMBER that you cannot expect new-model production from a machine five years behind today's improvements.

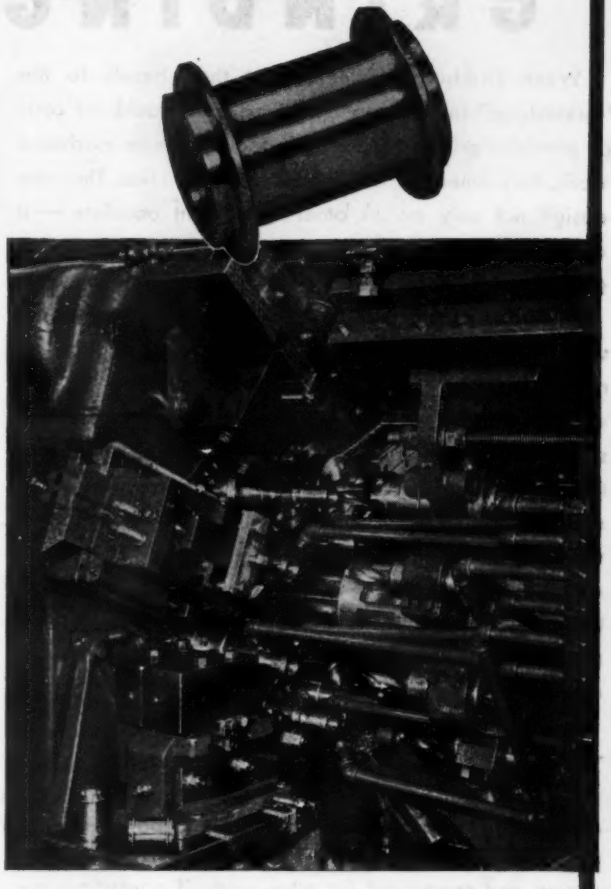
There are a lot of Acme-Gridleys now on war work that will someday be out of a job. They were all top-notch producers when delivered, but some of them may have been overworked or under-cared for.

Our interest is to see that you get maximum value from any Acme-Gridley, whether you buy a used machine on the open market, or a new machine from us.

Please feel free to write us when in the market.



ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
maintain accuracy of the highest spindle speeds and fastest feeds modern cutting tools can withstand.



A TYPICAL ACME-GRIDLEY COST-SAVING JOB

2¼″ diameter steel hub turned from bar stock on 2⅝″ Model RB 8-Spindle Bar Automatic.

15 operations—15 tools at work simultaneously—machine time, 28 seconds.

THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

TWO HEADS ARE BETTER THAN ONE IN MULTIPLE PRECISION GRINDING

When Fitchburg engineers put their heads to the "grindstone" to develop a method that would cut costs on precision grinding as multiple tooling has on machined work, they emerged with a revolutionary idea. This new design not only makes other equipment obsolete — it also prevents its own obsolescence by its unique engineering feature!

The basis of this Fitchburg method is an independent standard interchangeable grinding head which may be mounted singly or in multiples on standard or special equipment, and may be regrouped and remounted on standard machines or on new special bases, for operations other than the one originally specified. Mounted singly, it can perform more jobs than was thought previously possible — straight or bevel gears, internal or external gears, etc. — due to its independent positioning and its ability to be set at any angle the work requires. Mounted in multiples, its production uses are even greater.

THE HEAD. *The Bowgage Head* is a completely independent precision grinding unit. It has rapid traverse, slow grinding feed, grinding dwell or spark out, and rapid return to starting position — all started by one push button. It is precise to .0002", minimizing spoilage. It can be removed and remounted for other work, if operations are changed.

THE BODY. *This Fitchburg Double-Head Grinder and Polisher for Gear Shift Grooves* is typical of many special Fitchburg machines into which independent Fitchburg heads can be built to cut costs through multiple automatic grinding on mass production. One grinding wheel rapidly traverses into the slot and then an automatic side wheel motion grinds one side of the slot, then the other. Meanwhile, the other grinding wheel comes in and finish-polishes the first side ground, then the second side which has just been ground. This is an automatic cycle from start to finish.

Write Today for Catalog—Sent Free Upon Request

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Fed Universal Grinders and Special Purpose Grinders.

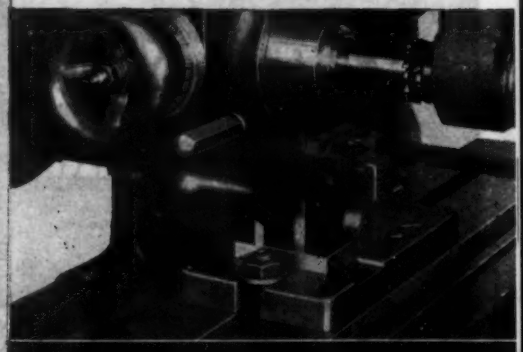
ADAPTABILITY OF Nº 000

• • • TO A WIDE VARIETY OF WORK-HOLDING FIXTURES

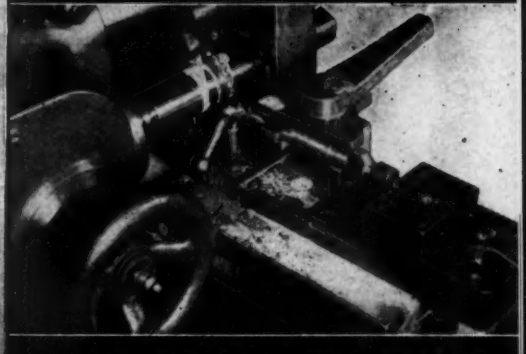
IMPROVES PRODUCTION OPPORTUNITIES ON SMALL PARTS MILLING

Check the savings possible on the No. 000 Plain Milling Machine — either with standard equipment — or with equipment especially designed for a specific purpose.

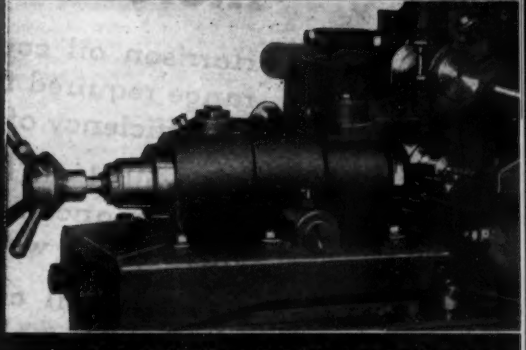
B·S BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U. S. A.



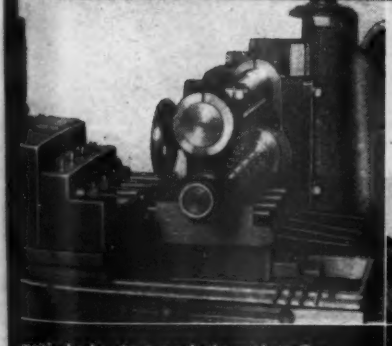
Simple clamping fixture for milling a flat on a small camshaft — two at a time.



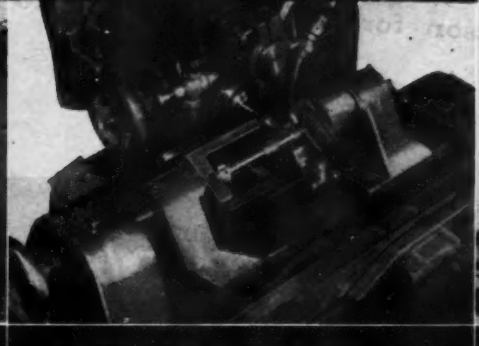
Cam-operated fixture for milling the sleeve lock in a rifle bolt—a fast, short cut.



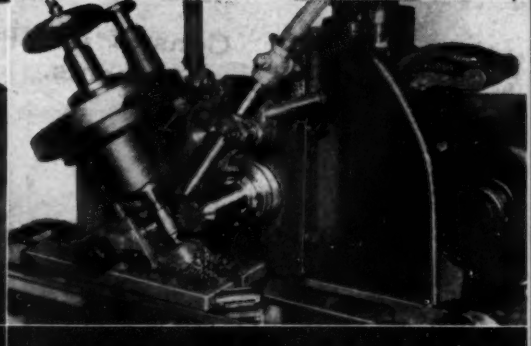
Automatically rotated fixture makes two quarter-turn helical cuts in a spiral-jawed clutch.



matic indexing and clamping fix- for milling flutes in four taps ltaneously.



Profiling fixture for automatically milling extractor cam on rifle bolt.

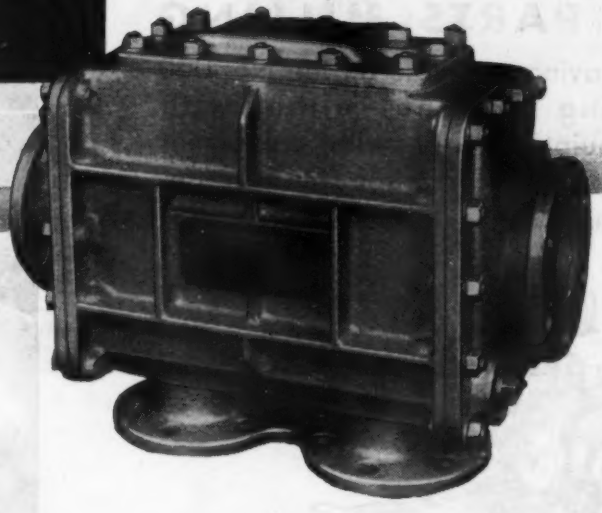


Hand-indexed fixture for cutting longitudinal slots in hydraulic pump rotor.

BROWN & SHARPE

ON THE HOME FRONT—BUY MORE WAR BONDS

HARRISON OIL COOLERS



Increase Machine Tool Efficiency

Harrison oil coolers keep lube oil temperature within the range required for proper and safe lubrication . . . increase the efficiency of machine tool performance.

Controlled oil temperature plays a very important role in maintenance . . . helps eliminate costly overhauls, because there is less wear on critical parts.

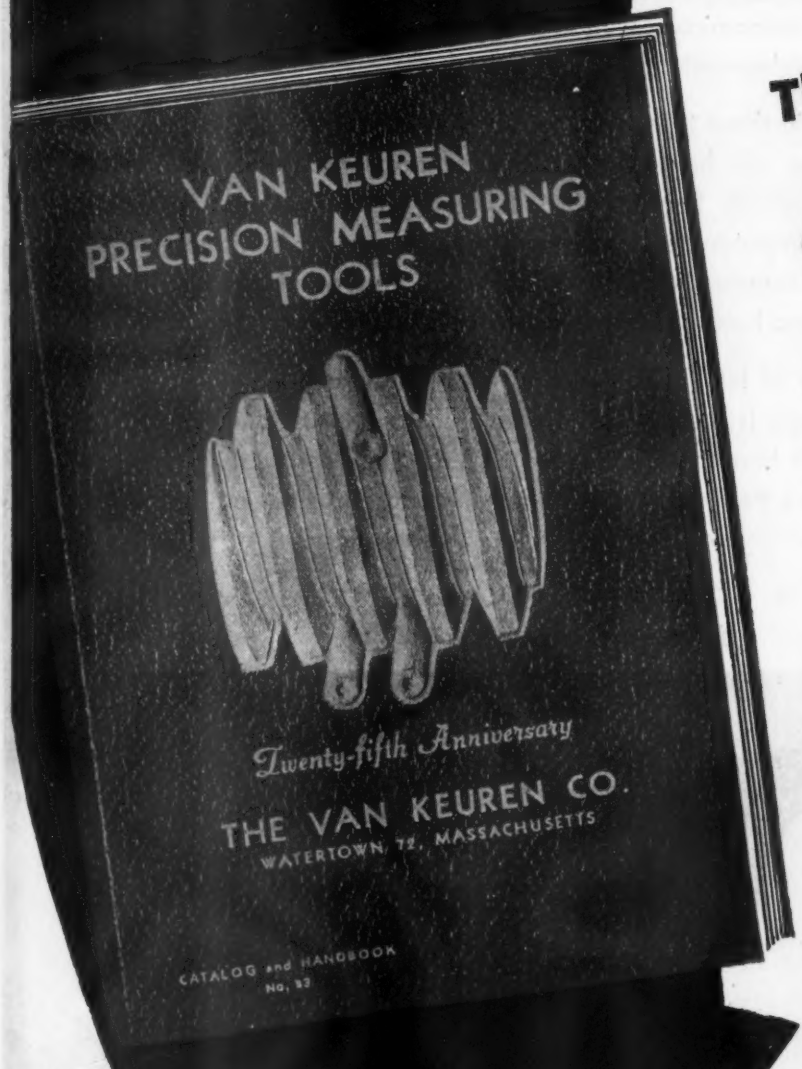
Harrison oil coolers are proving these benefits on many different types of installations. Rugged and exceptionally compact, they are particularly adaptable where space is limited.

Consult Harrison for recommendations to meet your requirements.

HARRISON

HARRISON RADIATOR DIVISION OF GENERAL MOTORS, LOCKPORT, NEW YORK

1945 REVISED EDITION
NOW READY FOR DISTRIBUTION



The NEW *Van Keuren* CATALOG and HANDBOOK No. 33

This new, revised Technical Catalog and Handbook contains 160 pages of practical, useful information in ready reference form on precision measuring. It describes, by text and illustration, various accepted methods and equipment for checking accuracy to hundred thousandths and millionths of an inch.

Through the use of the Van Keuren equipment described in this handbook, many outstanding improvements in production and product quality have been attained, and closer tolerances more easily achieved.

PARTIAL LIST OF CONTENTS

NEW PRODUCTS:

New Light Wave Equipment with fused quartz optical flats.
New Laboratory Type Monochromatic Light.
New Solid Square Master Blocks having permanent accuracy.
New and complete Gear Measuring Tables from 5 to 500 teeth.

ENGINEERING DATA

How to measure standard and special screw threads.
Screw Thread data including tables of basic diameters and tap drill sizes for all American threads.
Thread proportions for American and Foreign threads.
Bureau of Standards measuring wire specifications.
How to measure spur and helical gears.
How to measure angles.
How to use optical flats.
Notes on gaging holes.

THE *Van Keuren* COMPANY

176 WALTHAM ST., WATERTOWN 72, MASS.

MAIL COUPON TODAY FOR YOUR COPY

25th Anniversary

THE VAN KEUREN CO., 176 WALTHAM ST., WATERTOWN 72, MASS.

Kindly send me a copy of your 1945 New and Revised Catalog and Handbook No. 33. It is understood that this request incurs no obligation.

Name .....

Position .....

Company .....

Address .....

New NORFLEX POLISHING WHEELS

Many finishing, de-burring and polishing jobs can be done better and more economically with NORFLEX* Polishing Wheels—a new Norton development.

Available in three types to meet varying conditions and requirements they all have the common characteristics of leaving smooth, uniform finishes. In all three types the abrasive is uniformly impregnated throughout the wheels from periphery to hole. Also common to all three is the flexible type of bond which supports and holds the abrasive particles in place.

The ability of NORFLEX Polishing Wheels to meet a wide range of conditions is due to the available choice of cushioning materials in the bond: Fiber Resinoid, Type F; Resilient Rubber, Type R; and Cork Resinoid, Type C. Your Norton abrasive engineer or Norton distributor will give you the complete story.

NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

*Trade-mark

W-1013A

NORTON ABRASIVES

AUTOMATIC DOUBLE-END —Threading —Pointing —Turning —Drilling On a CLEVELAND

Model J . . . This is an automatic, magazine-loading, double-end machine. Typical uses . . . Double end threading of nipples or studs . . . Facing and/or chamfering, or tapping couplings and bushings . . . turning shoulders, pointing or chamfering pins, dowels and comparable pieces. Model J-1″ works pieces 3″ to 11″ long. Model J-2″ handles 3¼″ to 14″ pieces. Proposals include tooling and production estimates on your particular job . . . write for yours today, or for descriptive bulletin on complete Cleveland line.

Just Remember . . . Clevelands Cut Costs

CHICAGO (6):
1408A Civic Opera Building
DETROIT (2):
540A New Center Building
NEW YORK (6):
1806A Singer Bldg.
CINCINNATI (12):
4932A Beech Street
HARTFORD (1):
529A Capital National Bank Building

THE CLEVELAND AUTOMATIC MACHINE CO.

THE CARPENTER STEEL COMPANY · 109 W. Bern St., Reading, Pa.

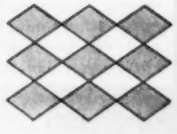
The Standard Tool Steels of Industry

Here's How to Find Out...

Men stand idle at machines every time a tool is reground or replaced. Time is wasted in the tool room and in heat treating. But now there is a way to stop the costly loss from tools that wear too rapidly or fail prematurely. Even in plants where everyone is satisfied with tool life, the Carpenter *job analysis plan* has stopped the hidden loss of man-hours, tool steel and money. Put these three easy steps to work now. Then watch costs go down and output rise.

1. Double Check Each Job at the Start!

In hundreds of plants Tool Engineers are using the Carpenter Matched Set Method to get tools that stay on the job longer. And it works! This method is a *tried and proved* way to save man-hours at machines, in the tool room and in heat treating. In easy steps it shows which tool steel will give best results on each job. Find out how it can help you gauge tool performance before tools are made. Drop us a note on your company letterhead and ask for the Carpenter "Matched Tool Steel Manual". It is a 167-page book (Free in the U. S. A.) that will give you down-to-earth answers to your tooling problems.



2. Follow Up With Heat Treating "Know How!"

No one has to tell you how important heat treating is in getting 100% performance from tools. And here is your insurance that proper heat treatment will back up your work in designing and making tools. The Carpenter Heat Treating Guide is a handy slide chart that puts complete, correct information at your fingertips. It gives forging and normalizing heats, annealing and hardening treatments, recommended drawing ranges for all the Matched Tool Steels. Plus tips on quenching, drawing and furnace atmospheres. Ask for your free Heat Treating Guide. You can use it to get tools that reduce down time, save man-hours and cut costs.

3. Check Each Tool on the Job!

How many pieces does each tool produce between grinds? Which tools fail too soon in service? Answers to those questions give you a yardstick to use in improving tool performance. And for personal help with your job analysis plan, call your nearby Carpenter representative. He knows tool steel from A to Z and can provide real engineering help.

Carpenter MATCHED TOOL STEELS

BRANCHES AT
Chicago, Cincinnati, Cleveland, Detroit, Hartford, Indianapolis, New York, Philadelphia, St. Louis

MODERN PRESSES

Modern Cleveland 4 Point Press having a capacity of 750 tons, stroke 30", adjustment 6", Bed area 80" x 144", shut height 60" and operates at 14 strokes per minute.

Cleveland Single Point Press, capacity 250 tons, stroke 12", adjustment 5", bed area 36"x36", strokes per minute 18

Cleveland Two Point Press, capacity 300 tons, stroke 16", adjustment 8", bed area 40"x 66", strokes per minute 12.

The Modern line of Cleveland Presses consists of Single Point Presses having a single connection located in the center of the slide; Two Point Presses having two connections, one at each side of the slide; and Four Point Presses having four connections, one of each being located at approximately each corner of the slide. The design of these Cleveland Presses is such that the gears, flywheel and drive unit are enclosed in the box type Crown and there are no overhanging projections. This type of press can be furnished in sizes to suit requirements and with electrically controlled hydraulically or pneumatically operated clutch.

THE CLEVELAND PUNCH & SHEAR WORKS CO. CLEVELAND 14, OHIO

TURNING QUESTIONS ANSWERED!

WHY A STANDARD SPINDLE NOSE?

Because it is the easiest, quickest and most positive "on and off" for chucks or face plates. It is particularly appreciated on the big lathes where the large and heavy face plates would present time losing difficulties under other methods. With the LeBlond Standard Spindle Nose, the chuck or face plate is simply lifted to the nose and easily slipped into place. There it stays, perfectly centered and in exact position, leaving both hands of the operator free to tighten the coupling collar. Its Positive Key drive takes all driving and stopping stresses without loss of accuracy. The locking collar insures a lock-tight mounting against the 16.59 degree tapered nose. This taper instantly releases the chuck or face plate when the locking collar is loosened. The Standard Spindle Nose is another of the many LeBlond features ... another reason why men of production specify LeBlond Lathes.

★

SINCE 1887

the world has been turning to LeBlond for turning equipment.

★

YOURS FOR THE ASKING

Our field engineers are prepared to help you in your development work, particularly along the lines of the difficult, the "out-of-the-ordinary" turning problems. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war—gained over a period of nearly 60 years from thousands of installations all over the world is yours for the asking. Contact our nearest dealer or write Department FE46.

WRITE FOR CATALOG!

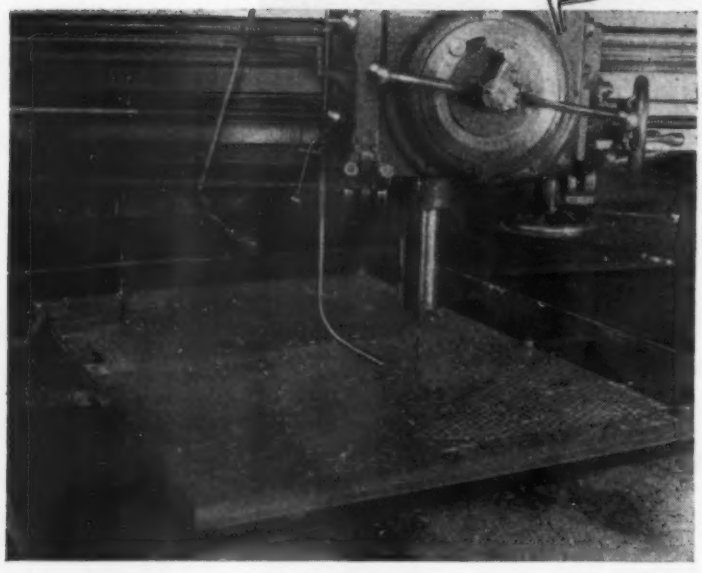
★ YOUR BONDS BUY BOMBS ★
BUY A "BLOCK-BUSTER" TODAY!

THE R. K. **Le BLOND**

MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.

NEW YORK 6, Singer Bldg., 149 Broadway, WOrth 2-0722
CHICAGO 6, 20 North Wacker Drive, STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES



FOSDICK RADIAL

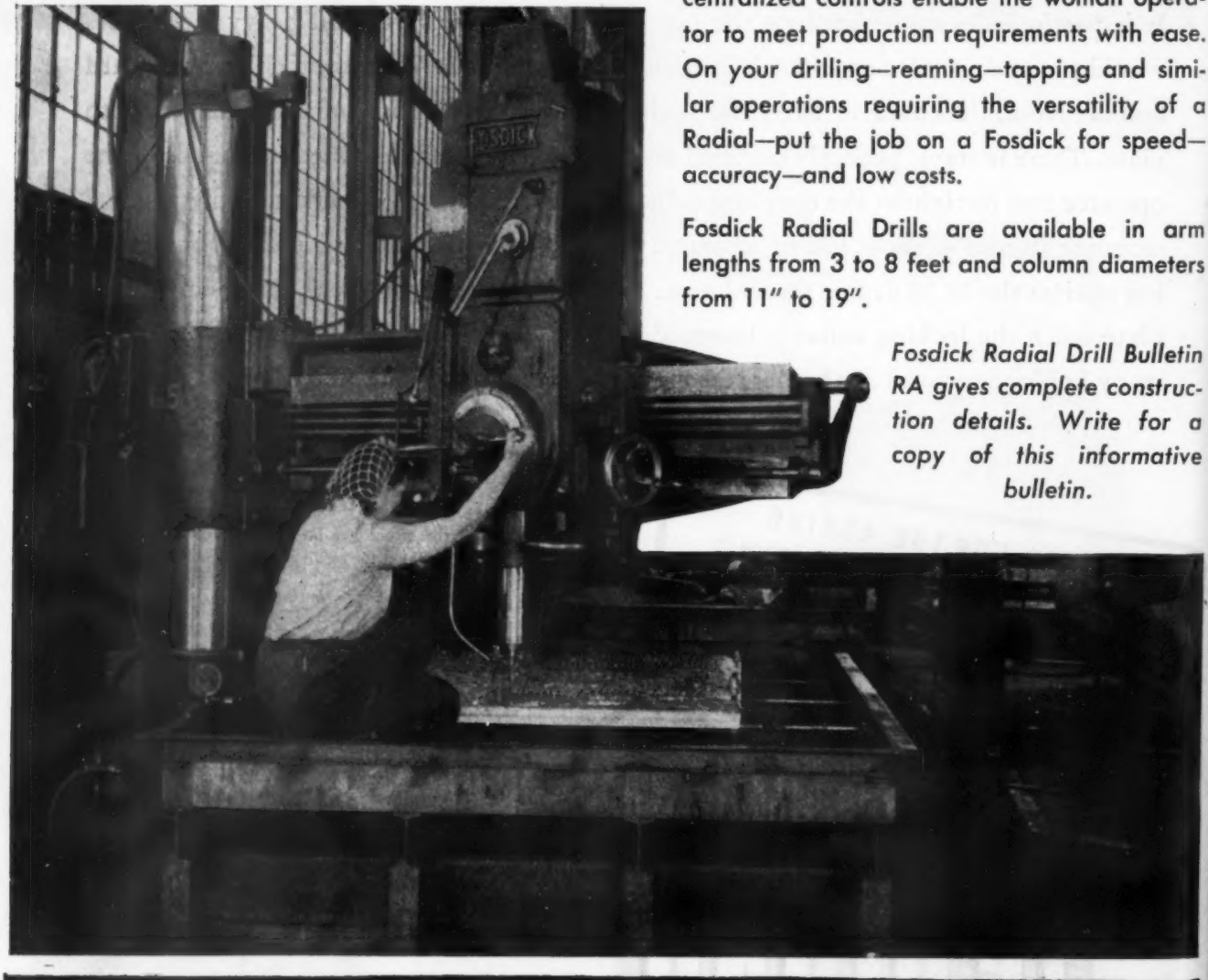
is easy to operate

● Not only is this Fosdick Hydraulic Radial so easily controlled that women can become expert operators in a short time, but its rigid construction and simplicity make for accuracy and high production.

This job is a "natural" for a Radial and the centralized controls enable the woman operator to meet production requirements with ease. On your drilling—reaming—tapping and similar operations requiring the versatility of a Radial—put the job on a Fosdick for speed—accuracy—and low costs.

Fosdick Radial Drills are available in arm lengths from 3 to 8 feet and column diameters from 11" to 19".

Fosdick Radial Drill Bulletin RA gives complete construction details. Write for a copy of this informative bulletin.



FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ··· OHIO

6 PATENTED DUAL-SPIRAL REAMERS

FINISH AS MANY SIZE HOLES AS 30 ORDINARY EXPANSION REAMERS

Set of 6 pictured (No. JR) sizes ½", ⅝", ¾", ⅞" 1", 1¼", has dimensional range from .495" to 1.295". Reamers furnished with pilots and tapered guide bushings for alignment reaming work. This set satisfies practically every reaming need of the average die, tool, and maintenance shop. Two left-hand flutes spiral opposite to right-hand flute, shearing mirror-smooth finishes in any metal or plastic.

- ★ 500% Greater Expansion Range.
- ★ Replaceable Blades May Be Sharpened Up to 8 Times.
- ★ Straight Line Expansion.
- ★ Five Types Available.
- ★ Individual Reamers, Sizes ½" to 3-3/32".

WRITE FOR CATALOG

LEMPCO

5711 Dunham Rd. Bedford, Ohio

MANUFACTURING CONTROL

THE KEY TO UNIFORM CARBIDES

THE art of manufacturing uniform cemented carbides requires the same "exceeding care" exercised by the talented research men who established the fundamental principles and practices of this highly specialized branch of metallurgical science. That is why Kennametal is subjected to precise control throughout every stage of its manufacture, by means of scientific instruments in the hands of skilled technicians. The objective of the chemical and metallurgical checks of processing is three-fold:

First, *to produce cemented carbides that will exactly suit predetermined requirements of differing character.*

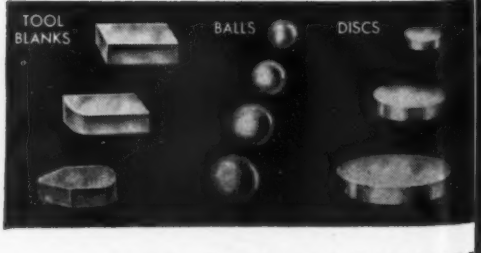
Second, *to assure that the desired characteristics of finished products are uniformly maintained.*

Third, *to form the basis for continued research looking to still further improvement in the properties and applicability of Kennametal.*

● The invention and development of Kennametal—a scientific achievement—has led to corresponding useful arts. Kennametal's ability to cut hard metals with sustained accuracy, at greatly increased speed, has made major contribution to the technique of high production machining and milling. Its unique wear-resistant properties have created opportunity which many manufacturers have seized upon to give their products greater serviceability.

The technological advancements that accompany the use of Kennametal serve to suggest the tremendous potential benefits to society that are always inherent in a system under which inventive genius is granted the rights, and given the means, to encourage full utilization of its talent.

Typical **KENNAMETAL** *Products*



KENNAMETAL

SUPERIOR CEMENTED CARBIDES

TRADE MARK REG. U. S. PAT. OFF.

KENNAMETAL *Inc.*, LATROBE, PA.

Continental
CUTTING TOOLS

- Boring Bars and Tools
- Broaches
  Broach Pullers
  Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spotfacers
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools

CONTINENTAL TOOL WORKS
CTW
EX-CELL-O CORPORATION
45—79

The *Right* Tool Where and When You Want it

CONTINENTAL *Counterbore sets . . .*

. . . consisting of carefully selected variations and sizes to provide the most practical and economical combinations for toolroom use . . . are proving favorite cutting tools in all kinds of machine shops. Continental interchangeable counterboring and spotfacing tools have a wide range of uses. Two standard sets are shown below. Write to Continental today for details.

Above: Set No. 2, for the average-size toolroom.

To right: Set No. 3, for general needs of larger shops.

CONTINENTAL TOOL WORKS
DIVISION OF EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

ALUMINUM COMPANY OF AMERICA...

Service on all Magnesium Products

What alloy to use—Sand casting, die or permanent-mold casting, forging, shapes or sheet—you'll find help on this lightest of the light metals, Magnesium, as near as your telephone. Call any Alcoa office—

Sales Offices

AKRON 8, OHIO, 506 Akron Savings & Loan Bldg.
ALBANY 7, N. Y., 90 State St.
ATLANTA 3, GA., 1818 Rhodes-Haverty Bldg.
BALTIMORE 1, MD., 400 Baltimore Life Bldg.
BIRMINGHAM 3, ALA., 1320 First National Bldg.
BOSTON 16, MASS., 20 Providence St., Park Square
BUFFALO 7, N. Y., 1880 Elmwood Ave.
CHARLOTTE 2, N. C., 619 Johnston Bldg.
CHICAGO 11, ILL., 520 North Michigan Ave.
CINCINNATI 2, OHIO, 16th Floor, Times-Star Bldg.
CLEVELAND 1, OHIO, 1520 Midland Bldg.
COLUMBUS 15, OHIO, 526 Rowlands Bldg.
DALLAS 1, TEXAS, 821 Mercantile Bank Bldg.
DAVENPORT, IOWA, 918 Kahl Bldg.
DAYTON 2, OHIO, 302 Harries Bldg.
DETROIT 2, MICH., 610 New Center Bldg.
FAIRFIELD, CONN., Post Road
GRAND RAPIDS 2, MICH., 812 Michigan National Bank Bldg.
HARTFORD 3, CONN., 410 Asylum St.
HOUSTON 2, TEXAS, 1806 Commerce Building
INDIANAPOLIS 4, IND., 817 Merchants Bank Bldg.
KANSAS CITY 6, MO., 2300 Power & Light Bldg.
LOS ANGELES 14, CALIF., 108 West Sixth Street
LOUISVILLE 2, KY., 1154 Starks Bldg.
MILWAUKEE 2, WIS., 735 North Water St.
MINNEAPOLIS 2, MINN., 1060 Northwestern Bank Bldg.
NEWARK 2, N. J., 2706 Newark & Essex Bldg.
NEW ORLEANS 12, LOUISIANA, 911 American Bank Bldg.
NEW YORK 17, N. Y., 230 Park Ave.
OKLAHOMA CITY 2, OKLA., 1209 Apco Tower
PHILADELPHIA 9, PA., 123 S. Broad St.
PITTSBURGH 19, PA., District Sales, 1814 Oliver Bldg.; General Offices, Gulf Bldg.
PORTLAND 4, OREGON, 512 Porter Building
PROVIDENCE 1, RHODE ISLAND, 1421 Industrial Trust Bldg.
RICHMOND 19, VA., 213 Exchange Building, Sixth & Franklin Sts.
ROCHESTER 4, NEW YORK, 1331 Lincoln Alliance Bank Bldg.
ST. LOUIS 8, MO., 1002 Continental Bldg.
SAN FRANCISCO 4, CALIF., 615 Russ Bldg.
SEATTLE 1, WASH., 1411 Fourth Ave. Bldg.
SOUTH BEND 5, IND., 805 J.M.S. Bldg.
SPRINGFIELD 3, MASS., 301 Tarbell-Watters Bldg.
TAMPA 2, FLA., 401 Tampa Theatre Bldg.
TOLEDO 4, OHIO, 1804 Ohio Bldg.
TULSA 3, OKLA., 1405 Philtower Bldg.
WASHINGTON 5, D. C., 605 Southern Bldg.
WICHITA 2, KAN., 411 Fourth National Bank Bldg.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

H-P-M Hydraulic GIANTS FOR INDUSTRY

Realizing the ever increasing need for large presses, H-P-M plants are completely tooled to efficiently produce massive hydraulic presses, as well as smaller sizes. Typical H-P-M "giants" are illustrated below. Many other sizes and types have been built. Each press is completely self-contained, and is powered by the reliable H-P-M oil-hydraulic operating system.

The Hydraulic Press Manufacturing Company is the only builder of completely integrated presses, with press frame, radial pumps, valves and controls built by one company. Undivided responsibility to the user is thereby guaranteed. If your production involves pressure processing, call in an H-P-M press engineer to study your particular requirements. He can probably recommend an H-P-M press already designed, thus saving you time and cost of engineering. Write today, stating your requirements.

THE HYDRAULIC PRESS MFG. COMPANY, Mount Gilead, Ohio, U. S. A

BRANCH OFFICES: ***New York, Philadelphia, Cleveland, Detroit and Chicago. Representatives in principal cities.***

A 5000-ton H-P-M FASTRAVERSE rubber pad sheet metal forming press.

A 5000-ton H-P-M FASTRAVERSE magnesium forging press.

A 3000-ton H-P-M FASTRAVERSE, deep sheet metal drawing press.

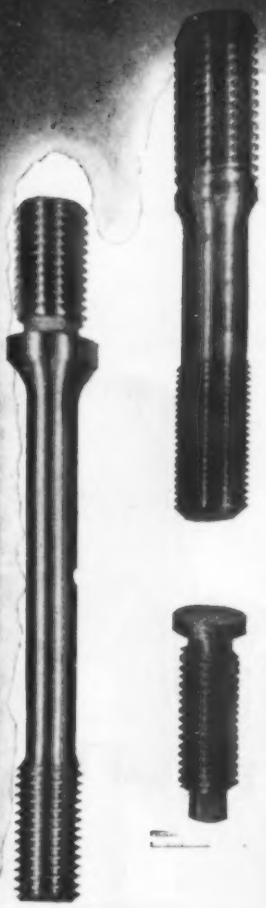
HPM

All-Hydraulic Self-Contained

FASTRAVERSE PRESSES

For...Coining, Drawing, Embossing, Forging and Trimming

Announcing...



Steinle Centerless THREAD GENERATORS

. . . produce a wide range of thread diameters on one machine.

. . . exceptionally close tolerances, much closer than required by A.N. Thread Standards, are obtained at fast production rates.

. . . threads can be produced at any desired part of the work piece by means of stops.

. . . entire machine easily accessible for servicing when required.

. . . capacity when handling preheated stock from ⅛" fine threads to 1-3/16", 9-pitch threads.

Send for illustrated literature giving further details.

What does it take to make a war?

It takes more than a toothbrush mustache, an upraised arm, a symbol on a flag.

And it takes more than guns and tanks and planes.

It takes ignorance, intolerance and want. . . . The psychopathic mire that breeds little conquerors, and the political softness that makes nations look the other way.

But what does it take to *prevent* a war?

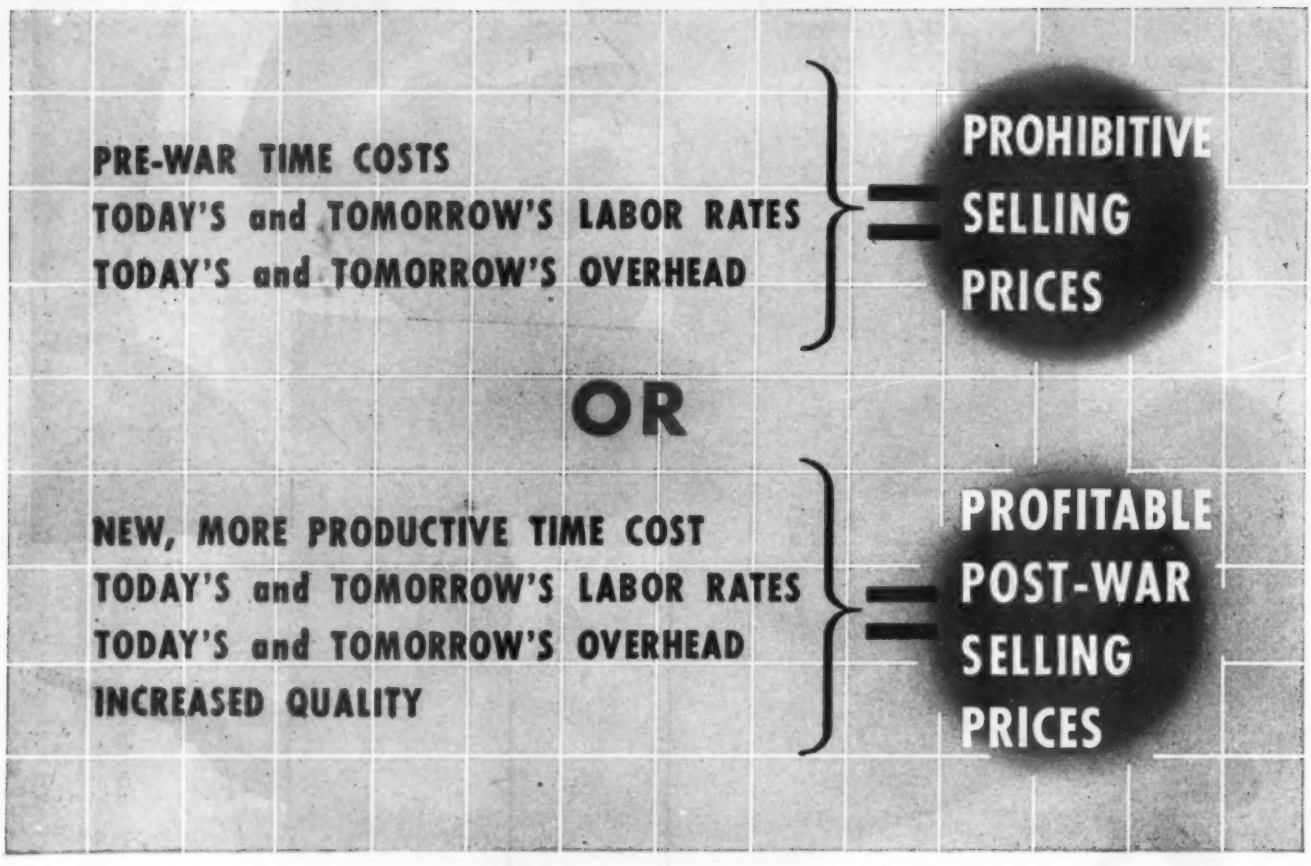
It takes knowledge, communication, and freedom of thought. . . . Economic opportunity, and productive power.

And it takes a strong police force to keep the rough neighbors kids in line and slap the gangsters down.

America lacked what it takes to *make* a war. But we have what it takes to win one . . . and to *prevent* one in the future. Today, the engineers of the basic machine tool producers stand ready to help the men of government and of industry in their postwar planning for a strong America — a nation powerful enough to prevent future wars with the strength of a healthy economy here at home, and the best equipped military police force the world has ever seen.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

To Insure Your Enterprise TRY THESE FORMULAS



RING GAGE ACCURACY AT PRODUCTION RATES BY

MICROHONING

Microhoning offers to industry a new tool with which to meet post-war demands for better products at moderate cost—at possibly increased labor rates. A process of final machining, **Microhoning now assumes added responsibility—it removes from .010 to .030 stock under automatic sizing control. By providing ring gage accuracy *at production speeds*, it offers a way of using the second formula to achieve profitable post-war prices.**

It will correct error in bores, or on cylindrical or spherical surfaces, either before or after heat treating—providing form and size accuracy to "tenths." In removing stock, it does not cause heat cracks. By removing distorted surface metal and cracks left by previous operations, it eliminates two of the most frequent causes of fatigue failure.

This modern abrading process also provides any desired surface finish. It is not limited in its application to iron and steel products, but is in successful operation on a wide variety of non-ferrous metals, such as silver-lined bearings and chromium-plated cylinder bores.

Micromatic Hone Corporation builds machines for Microhoning as required in industrial production. These range from tool room type machines arranged to handle a wide variety of work to multiple spindle production machines which provide accuracy and high speed on production parts.

Microhoning can be very useful in your post-war production. Let our engineers discuss applications with you.

MICROMATIC

MAKERS OF

New MICROMATIC HYDROHONER MODEL 705

MULTIPLE SPINDLES

AUTOMATIC ROTARY INDEXING

MICROSIZE CONTROL

MICRODIAL FEED CONTROL

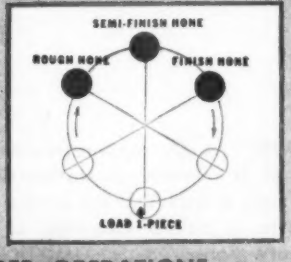
This new Micromatic Hydrohoner is a high speed production model, designed to produce large quantities of high precision parts. It may be used in multiple or progressive honing within uniform size limits (maximum) of .0003", on parts such as these:

Diesel Fuel Injectors, Pinion Gears, Precision Bearings, Bushings, Compressor Housing Bores, Piston Pin Holes, Connecting Rods, Valve Guides, Hydraulic Pump Bores, Rocker Arms, Ceramic Tubes, Valve Bodies.

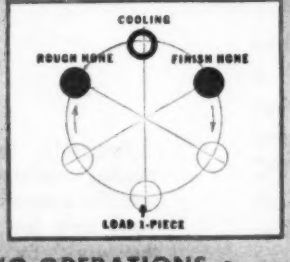
Variations in error which usually occur in production are corrected in straight run honing. Uniform size is automatically generated through the Micromatic Microsize Control—a positive, fully automatic method of generating uniform size.

Each spindle has its own individual Microsize Control, so that any desired combination in multiple or progressive honing may be set up.

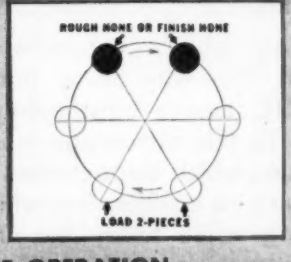
Three typical set ups are illustrated below:



THREE OPERATIONS. Progressive Honing Operations permit maximum stock removal per unit of time. Usually recommended for maximum stock removal ranging from .007 in ¼" diameter bores to .010 in 1" diameter bores.



TWO OPERATIONS. Progressive Honing Operations permit medium amount of stock removal per unit of time. Usually recommended for maximum stock removal ranging from .0035 in ¼" diameter bores to .005 in 1" diameter bores.

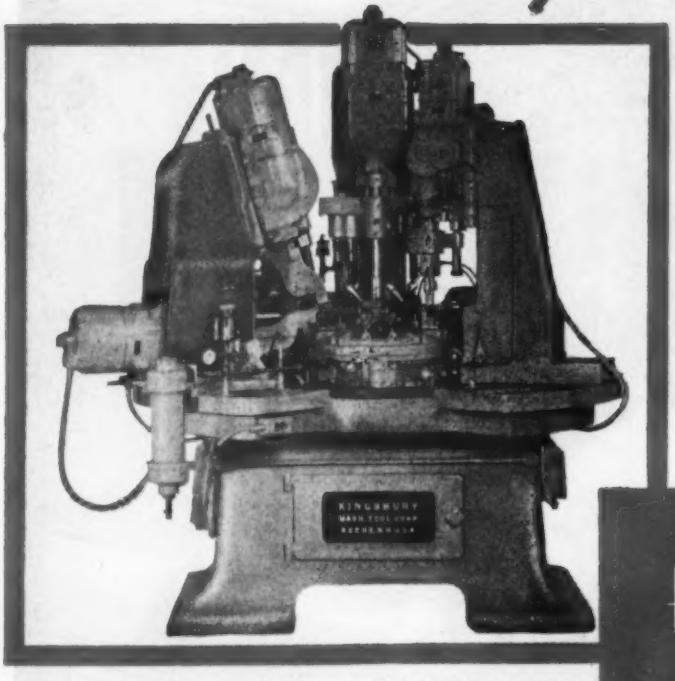


ONE OPERATION. Multiple Honing Operation permits conventional amount of stock removal per unit of time. Usually recommended for maximum stock removal ranging from .0005 to .0015 for hardened parts (55 Rock. C or harder), .001 to .003 for soft or medium hard parts, in bores from ¼" to 2" diameter.

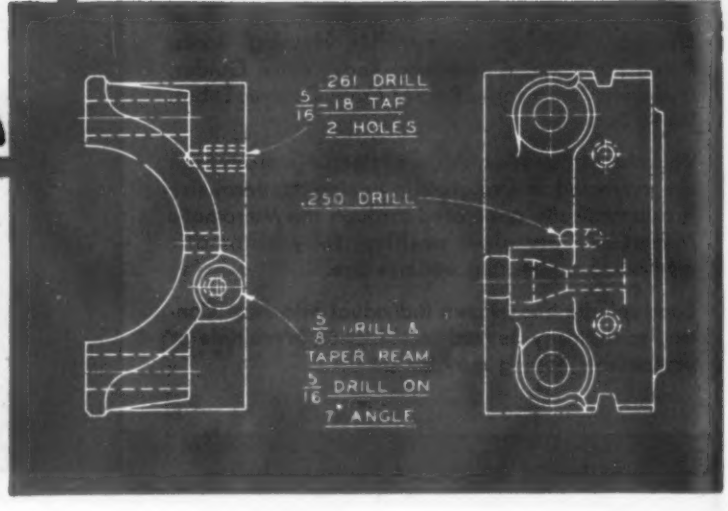
HONE CORPORATION DETROIT 4, MICHIGAN

HONING MACHINE TOOLS

FLEXIMATIC
by KINGSBURY



Three operations from three different directions handled in a single chucking of the work . . . . . .



The advantage of the KINGSBURY FLEXIMATIC method for performing various machining operations in a single chucking of the work is exemplified here. The parts involved are automobile rear main bearing caps which are drilled, reamed and tapped on a Model GD FLEXIMATIC from three different directions without rechucking. All operations occur simultaneously during unloading and loading.

Obviously, ability to handle work of this nature in the way it is handled on a FLEXIMATIC means outstanding production capacity. To this advantage must be added the precision which characterizes FLEXIMATIC performance—a combination which is of such outstanding value today because it makes every minute count in high speed precision production. Furthermore, KINGSBURY FLEXIMATICS conserve man power through the ability of one operator to easily out-step the productivity of several men on general purpose machines.

Basically, the FLEXIMATIC is an automatic indexing machine built up of a number of standard specific operation units in such a way that *all* operations can be performed in a single chucking of the work. By the Kingsbury-pioneered FLEXIMATIC method, unique, flexible and versatile machines are available not only for fast, accurate production but also for quick set-up and convenient change-over.

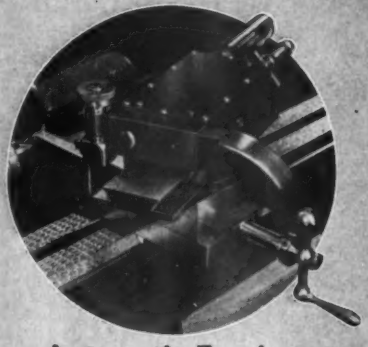
KINGSBURY MACHINE TOOL CORPORATION
KEENE NEW HAMPSHIRE U S A

918 PLAIN CABINET LATHE

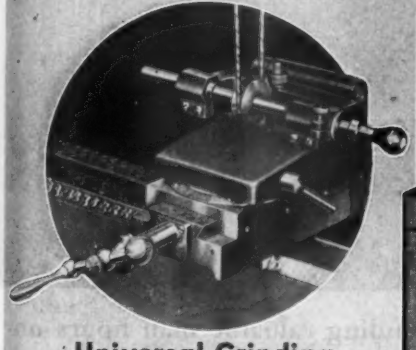
For

Tool-room — Assembly — Production

Spherical Turning



Automatic Turning



Universal Grinding

The Rivett No. 918 plain cabinet lathe is a versatile machine capable of many operations. In addition to the normal lathe functions of turning, facing, boring and drilling, the 918 can be equipped for milling, grinding, slotting and thread chasing.

The operating conveniences and design features assure efficiency on any operation. Work can be quickly gripped in collet or step chuck or mounted on centers or face plate. Selected spindle speeds are controlled by single lever. Built-in accuracy, correct spindle speed and dynamic balance guarantee finish to closest tolerance.

The machining capacity and producing efficiency of the 918 plain cabinet lathe open many opportunities for its use in the tool-room, assembly and production departments.

Write for bulletin.

SPECIFICATIONS

Swing over bed, dia.	9"
Distance between centers	18"
Collet capacity, max. dia.	1"
Step chuck capacity, max. dia.	6"
Jaw chuck capacity, max. dia.	6"
Spindle capacity, max. dia.	1⅛"
Slide rest, travel of tool post slide	5¼"
Slide rest, travel of cross slide	5¼"
Tailstock spindle travel	3½"
Spindle speeds, eight forward and reverse.	
Low range	150-2500 r.p.m.
High range	225-3750 r.p.m.
Weight of lathe, mounting and drive, net	850 lbs.

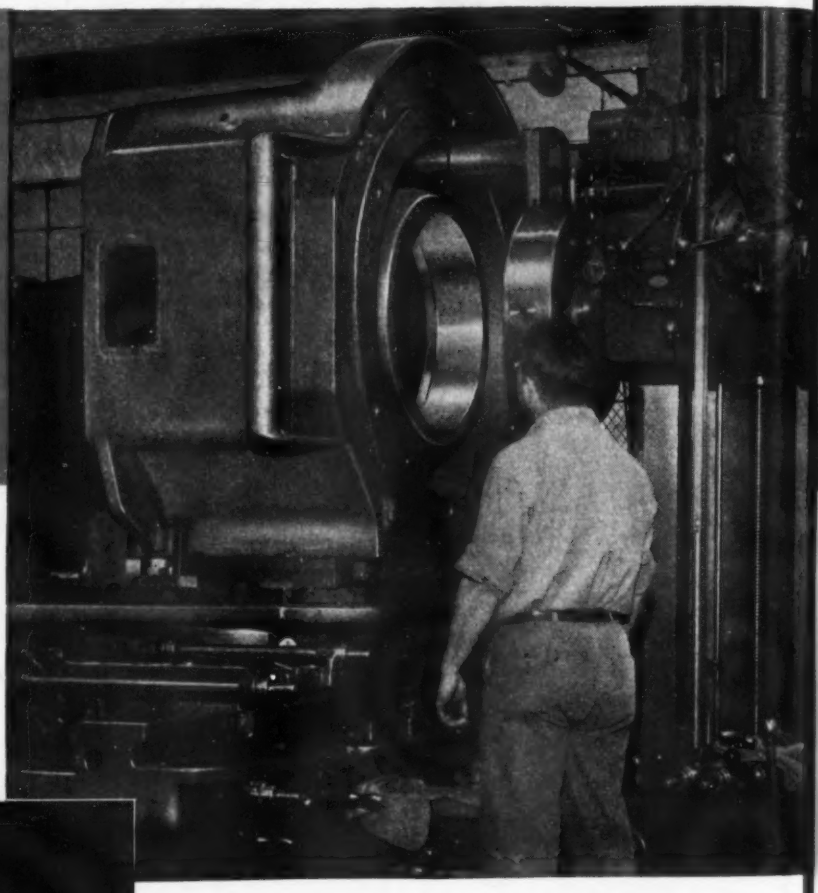
RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON • BOSTON • MASS. • U. S. A.

THESE LARGE BORES

● G. & L. Horizontal Boring Machine Produces Work to Precision Limits...Scales and Verniers Locate Bores While Continuous Feed Facing Head Gauges Machined Diameters



(At right) Standard G. & L. Machine with Continuous Feed Facing Head and Rotary Table used for toolroom work. Note simplicity of Mounting machine base and saddle assembly on rotary table.

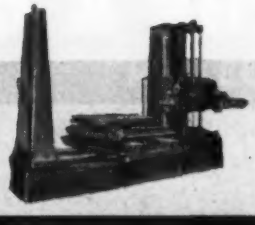
(Below) Close-up of machine saddle shows 24", 38⅞" and 50° taper bores.

● Are you spending valuable man hours unnecessarily in laying out work before machining and in checking work dimensions during the machining cycle? A large midwest manufacturer eliminates work layout and saves checking time when boring this special saddle by using a standard G. & L. Horizontal Boring, Drilling and Milling Machine with standard accessories. This means the workpiece is taken directly to the G. & L. without first locating the bore diameter. Machine

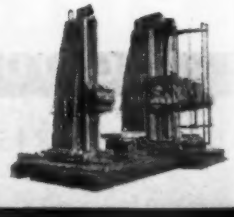
GIDDINGS & LEWIS

138 DOTY STREET

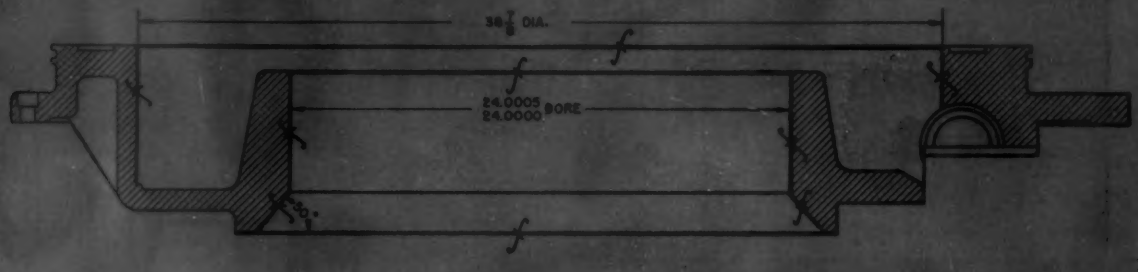
Right: G. & L. Table Type Machine.



Right: G. & L. Floor Type Machine.



HELD TO .0005"



Cross section of machine saddle showing dimensions of bores.

scales and verniers are used to accurately determine saddle position for precision boring. After machining cuts are started, the micrometer adjustment of the Continuous Feed Facing Head is relied upon to measure all semi-finish cuts. However, final .0005" measurements are made with micrometers. This procedure saves many hours in layout and checking.

Telescopic-type tool holders are used on the Continuous Feed Facing Head to bore the inner 24" and outer 38 7/8" diameters. The 50° taper bore shown through the 24" opening is made with a special taper boring tool used with the Continuous Feed Facing Head. The machine saddle is mounted on a standard power driven rotary table and after the bores are completed, the work is rotated for subsequent machining operations.

Manufacturing Costs Reduced... Production Increased

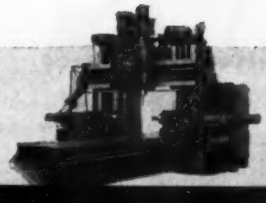
This is another example of the built-in accuracy of the Giddings & Lewis Horizontal Boring, Drilling and Milling Machine. In your own plant you may be spending valuable man hours on unnecessary layout and work checking which could be handled easily and simply on the G. & L. machine. If you wish to lower your manufacturing costs and increase production, our engineers will gladly study your machining problems. Recommendations showing how savings can be made will be submitted to you without obligation.

MACHINE TOOL CO.
FOND DU LAC, WIS.

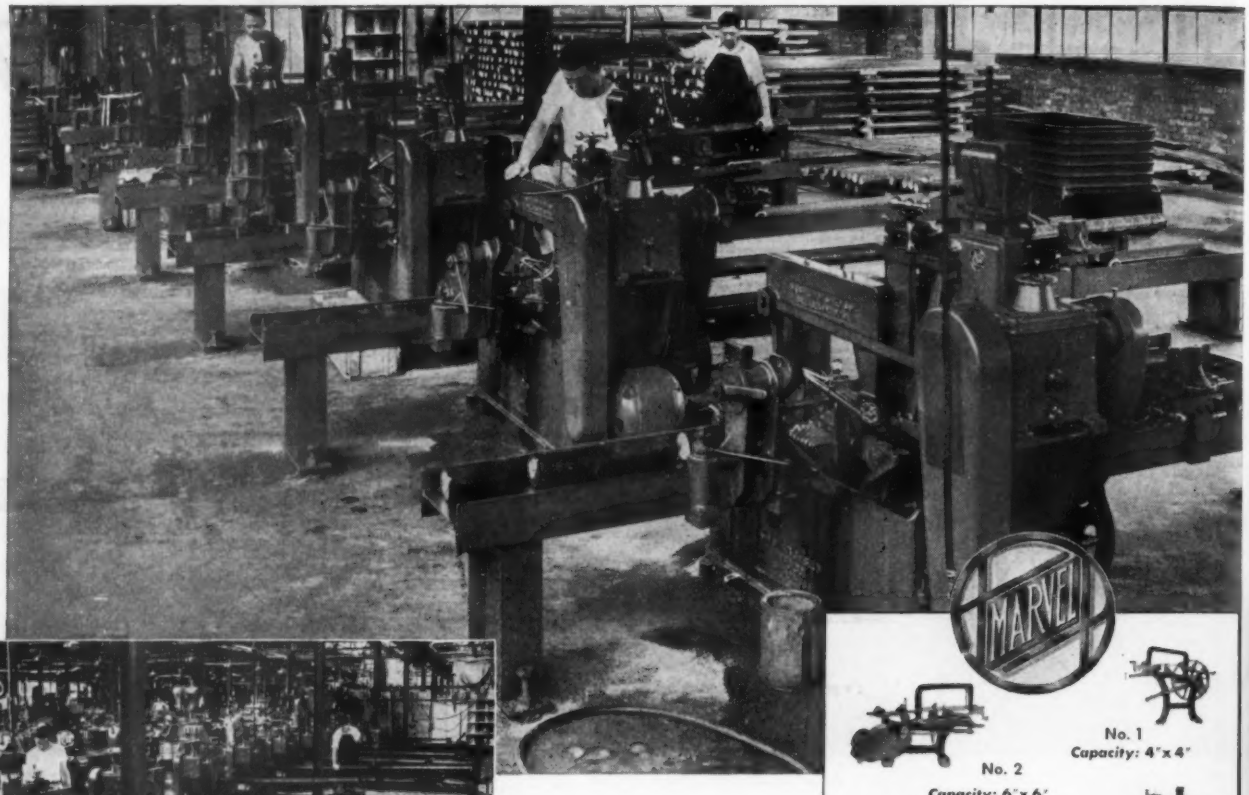
Additional Data

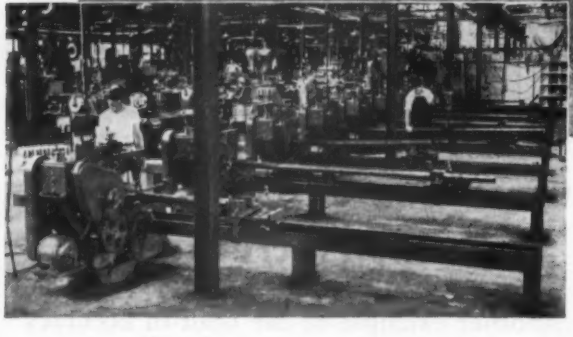
...complete information available on Giddings & Lewis machines, accessories and time-saving attachments. Write for Bulletin No. AM-75 today. Please indicate your business connection.

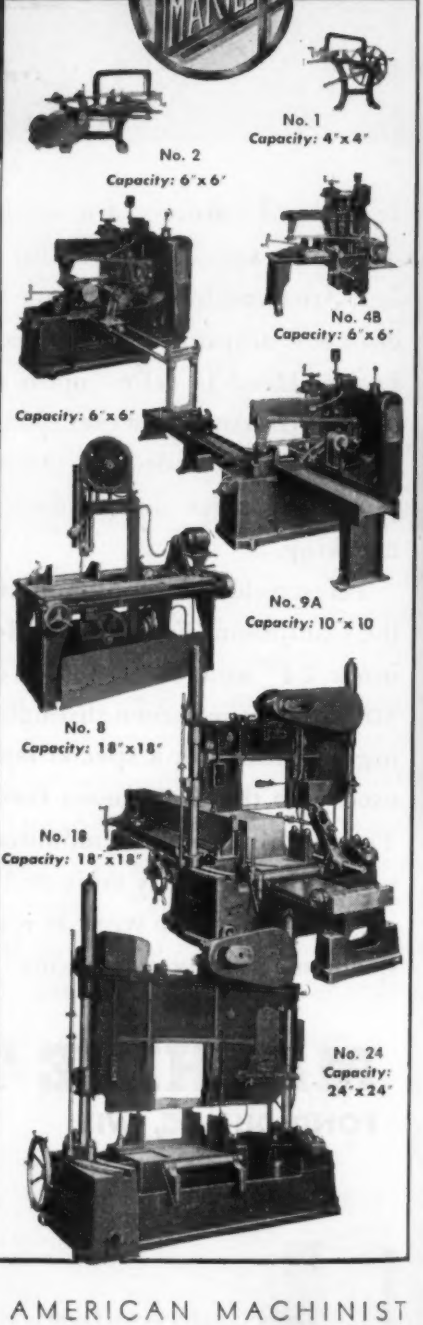
Left: G. & L. Planer Type Machine.



Left: G. & L. Multiple Head Type Machine.







WAYNE PUMP has a modern "automatic" cutting-off department

Here is an efficient cutting-off department—a battery of nine high-speed No. 9A MARVEL Automatic Bar Feed Hack Saw Machines, which are supplied from an adjacent stock pile by an overhead monorail system. These MARVEL "Automatics" have been continuously cutting-off accurate lengths from 3⅛" and 3-3/16" diameter bars (WD 4150 M hot rolled steel) since 1942. With only 3 operators this "automatic" cut-off department has been able to keep ahead of not only the Wayne's large ordnance contracts but their various subcontract jobs as well.

Under this continuous "pounding", at wartime speed, these "world's fastest" hack saws have proven "practically trouble free." Day in and day out for over three years they have continued to automatically feed, measure, and accurately cut-off endless numbers of pieces from single or nested bars, tubes and shapes with no more operator attention than is required by automatic screw machines.

MARVEL Automatic Production Saws come in two sizes, the No. 6A MARVEL, capacity 6" x 6" and the No. 9A MARVEL (pictured above), which has a capacity of 10" x 10". For larger size work the new MARVEL Giant Hydraulic Saws (capacities 18" x 18" and 24" x 24") are the first choice because they easily handle the largest sizes and toughest steels.

For quick reference see our section in Sweet's File—Mechanical Industries or write for catalog.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

STANDARD

Announcing DuBo

The Better PLUG GAGE

FIXED LIMIT TYPE

Color Signals

GREEN = GO

RED = NOT GO

PATENTS PENDING

Newest Development in Simple, Precise, Effortless BORE GAGING

Again STANDARD pioneers in producing DuBo, newest, most completely satisfactory bore checking gage of the fixed limit type yet produced. DuBo brings to bore gaging new, effortless, finger-tip control, assured precision and speed far beyond the scope of ordinary plug gages . . . whether used by skilled or unskilled workers. Vivid color bands unmistakably identify "go" and "not go" members; unusual lightness and balance minimize fatigue and fatigue-errors; simple manipulation makes DuBo ideal for use at bench or machine.

Simple, yet Precise . . . Light, yet Sturdy

EASY TO USE . . . TELLS MORE

Spherical shape, ingenious chamfering and relief, make entrance easy, gaging positive.

★

May be entered into bores actually smaller than gage diameter without forcing or marring work piece.

★

"Go" and "not go" color signals prevent confusion, fumbling, wasted motions, faulty readings.

★

Chamfer edge helps clean bore and prepares clean surface for accurate gaging.

★

Finger-tip "feel" and control reveal true internal conditions at any point in bore.

★

Reveals out - of - roundness, taper, belling and dimensional deviations by unmistakable tilt of handle.

★

May be used in deep bores and close to bottom of blind bores.

Write! Send NOW for illustrated DuBo bulletin . . . tells all about this remarkable new gage.

STANDARD GAGE CO., Inc.

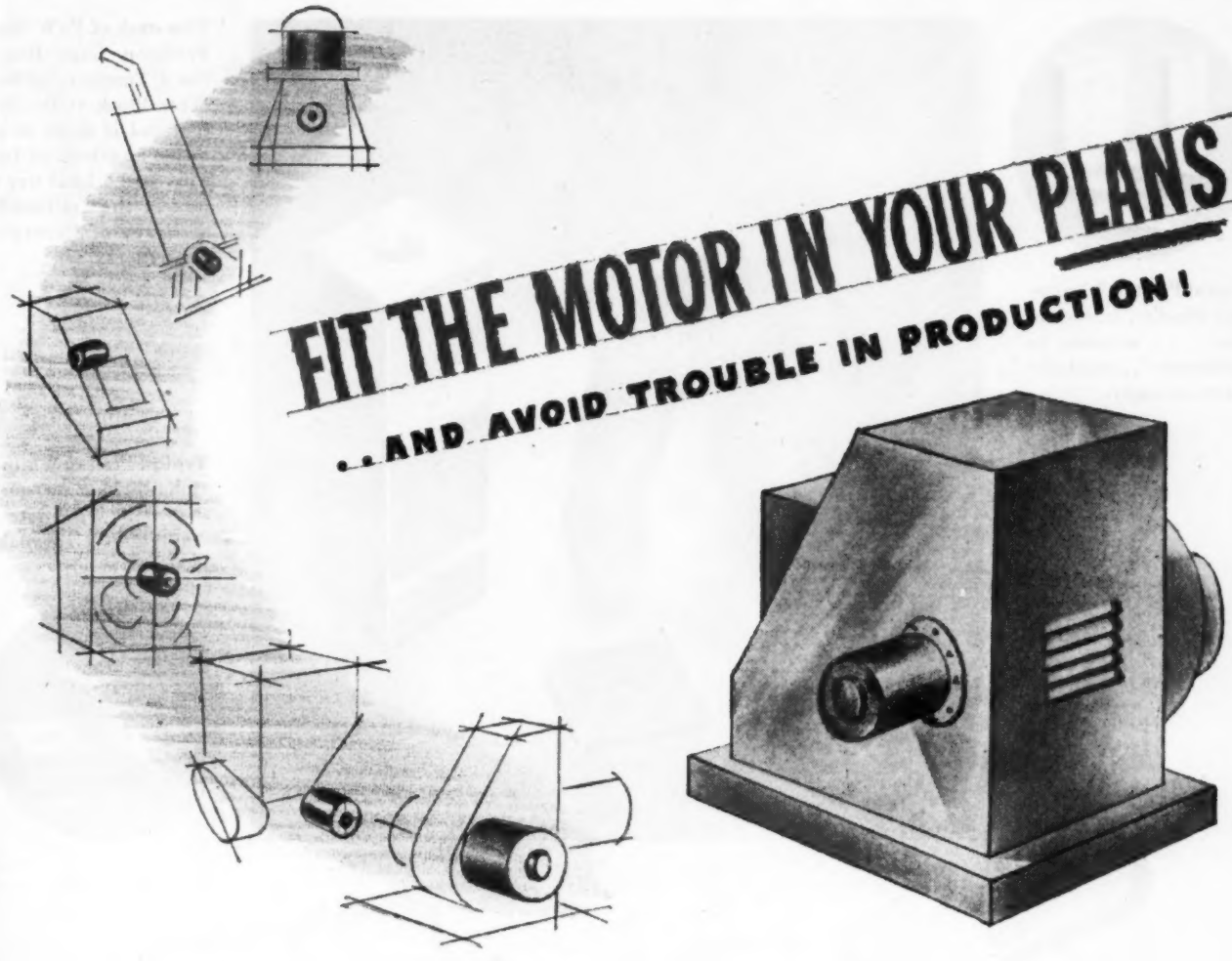
Poughkeepsie N Y

J & L COLD DRAWN

SQUARES • ROUNDS HEXAGONS • FLATS

Cold drawn and bright finished, accurate to size, with qualities and properties that save you money in the machining and manufacture of parts and products. Our metallurgical engineers will be glad to discuss your production problems with you.

JONES & LAUGHLIN STEEL CORPORATION PITTSBURGH 30, PENNSYLVANIA



FIT THE MOTOR IN YOUR PLANS

..AND AVOID TROUBLE IN PRODUCTION!

ASK A WESTINGHOUSE APPLICATION ENGINEER

NOW . . . BEFORE YOU "FREEZE" DESIGN

After your appliance is ready for production is a poor time to apply the motor. Do it while your designs are still in the planning stage. Double check to make certain that you have the right motor for the job. A minor change now may enable you to use an existing design, and avoid the extra engineering of a "special".

Westinghouse standardized motor designs offer many advantages, such as lower costs, faster deliveries, speedier production of appliances, lower inventory stock and simplified servicing.

Westinghouse engineering has resulted in many extra features built into standard motors for specialized service requirements. The service of Westinghouse application engineers is available at any time to help you meet your problems. Simply call the nearest office, or write Westinghouse Electric Corporation, Lima, Ohio. J-03228

MOTOR EXCHANGE PLAN PROVIDES

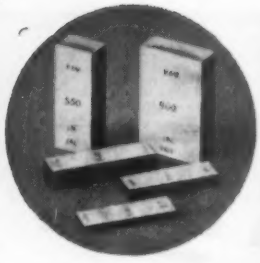
REPLACEMENT SERVICE IN 24 HOURS OR LESS

ANYWHERE IN THE UNITED STATES

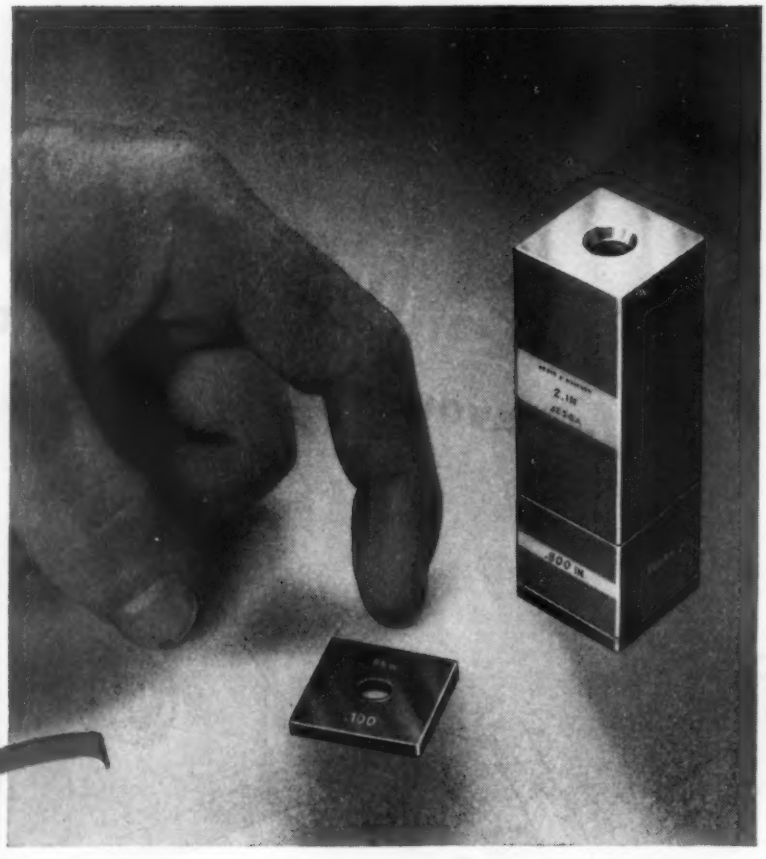
Westinghouse Motor Exchange points in all principal cities can service most Westinghouse small motors of standard sizes in 24 hours, or less, anywhere in the United States. This service gives the appliance user an efficient, factory-rebuilt replacement motor in exchange for his old motor at a low, flat cost. Your nearest Westinghouse office will give you full details. Ask for bulletin B-3336.

Westinghouse

SMALL MOTOR DIVISION

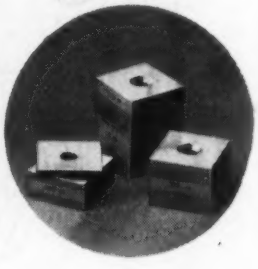


Typical Pratt & Whitney USA Blocks . . . rectangular . . . accurate to "millionths"... available in sets or singly.



This stack of P&W Hoke Precision Gage Blocks has a Tungsten Carbide Wear Block at the bottom and is about to acquire another on top. This is the ideal way to protect the "millionth" accuracy of Precision Gage Blocks.

Typical Pratt & Whitney Hoke Blocks . . . square shaped . . . accurate to "millionths"... available in sets or singly.



Safeguard VITAL ACCURACY

WITH TUNGSTEN CARBIDE WEAR BLOCKS

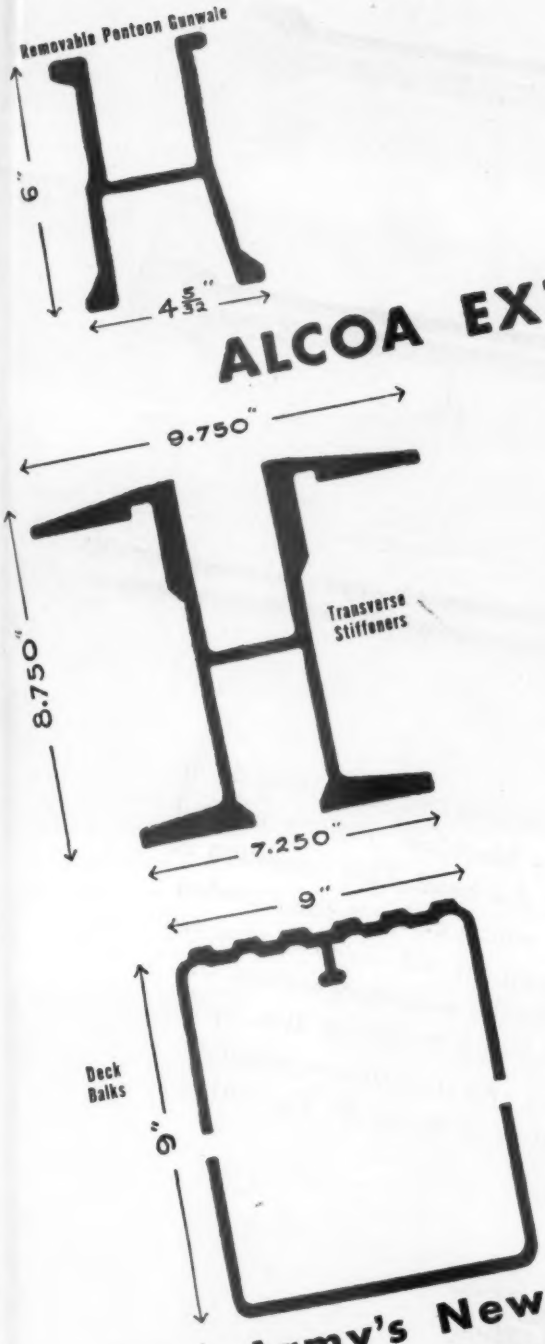
These wear blocks will greatly increase the useful life of your precision gage blocks. Made in two sizes — .050″ and .100″— they are used on each end of a stack of blocks so they receive all contact with the surface plate or the work. They possess extremely long life . . . much longer than the blocks they protect . . . yet they are just as accurate. They are available in both Hoke and USA types . . . delivered from stock.

If you are not sure of your precision gage block accuracy after long use, avail yourself of Pratt & Whitney inspection service. Regardless of make, we will report the exact condition of your blocks with any recommended replacements. With your blocks in first-class condition . . . and protected in use by Tungsten Carbide Wear Blocks — you are assured of long trouble-free service. Inspection service and new block delivery is approximately two weeks. Write for information.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT



ALCOA EXTRUDED SHAPES

Constructed largely of aluminum extruded shapes and sheet—from pontoon skids to bridge deck—this new bridge goes into place fast and carries heavy loads.

Alcoa Aluminum extruded shapes speed the manufacture of bridge and pontoon boat parts. Metal is distributed as you see it here, to suit strength and structural requirements. In many cases, parts are ready for assembly as extruded.

The light weight makes handling of the boats and bridge members easy. A 15-foot deck balk, for example, weighs only 215 pounds; can be carried by four men. Laid side by side, but staggered to distribute the load, these balks form a continuous beam of roadway. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Penna.

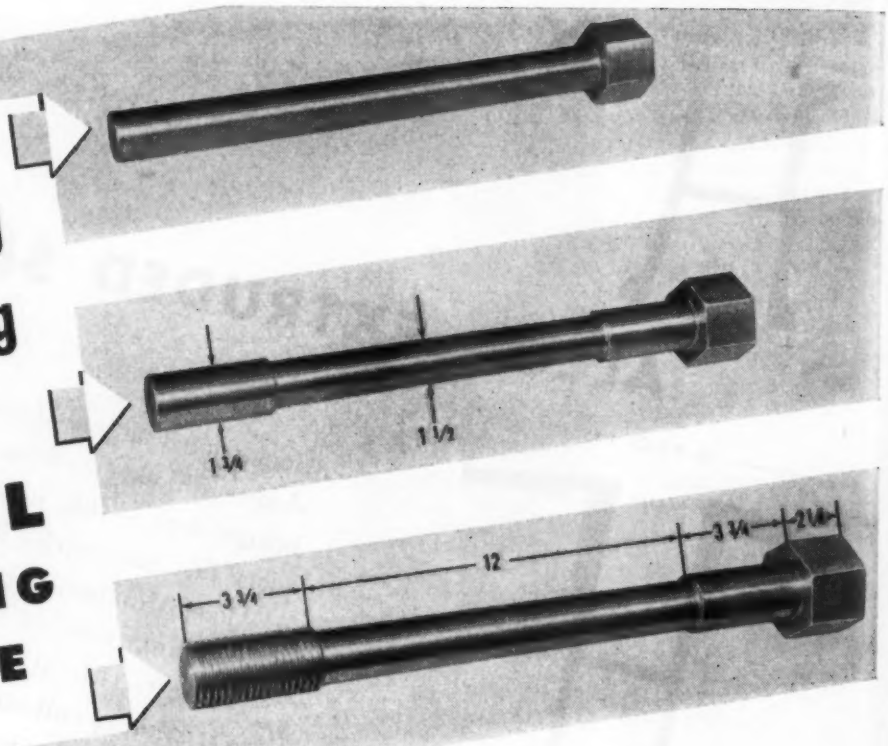
In The Army's New Aluminum Floating Bridge

The M-4 floating bridge was developed by the Corps of Engineers, Army Service Forces. It is capable of carrying a 50-ton vehicular load across currents as swift as ten feet per second. A 300-foot section can be in service in less than two hours.

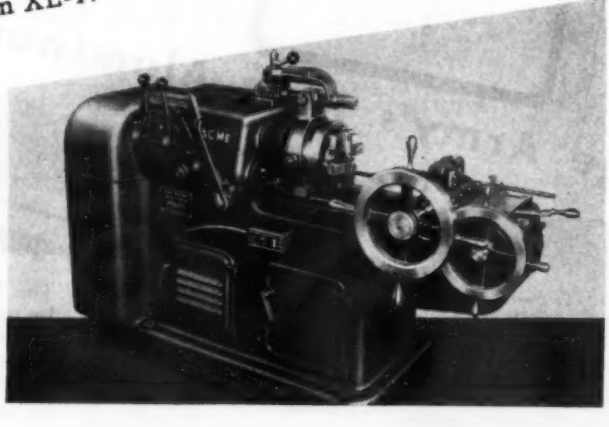
FIRST IN

ALCOA ALUMINUM

Hollow Milling and Threading *with an* ACME XL THREADING MACHINE



These jack bolts are hollow milled and threaded in two operations on an Acme XL 2-1/2" Single Spindle Threading Machine! Hollow milling is accomplished by using blank dies in the die head. This operation is made possible by the adjusting screw lever, which controls the opening of the die head and pre-determines the depth of cut . . . an exclusive feature of the Acme XL Threading Machine. In the second operation, the bolts are threaded by using the same die head with threading dies. Lead screw is used in conjunction with both milling and threading operations. For more information concerning the versatility of Acme XL Threading Machines, write for bulletin XL-7.



ACME XL THREADING MACHINES are built in single spindle from 1" to 3" inclusive; double from 1" to 2-1/2" inclusive.

THE HILL ACME COMPANY

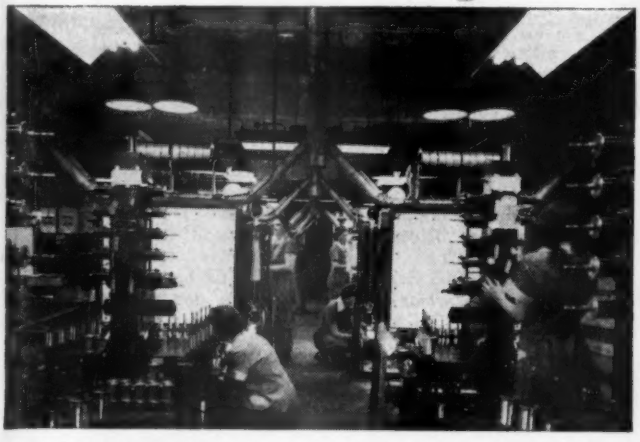
ACME MACHINERY DIVISION • ESTABLISHED 1882 • **4535 St. Clair Ave. Cleveland 14, Ohio**

FORGING · THREADING · TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" HYDRAULIC SURFACE GRINDERS "CANTON" ALLIGATOR SHEARS AND PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES AND SHEAR BLADES

4 TOUGH JOBS

. . . and how to lick 'em with G-E Mazda Lamps

Proper use of better lighting can produce startling results . . . in better efficiency, in reduced spoilage, in more and faster production. Shown here are four typical industrial jobs, each much improved with better lighting from G-E Mazda Lamps. Ask your G-E Lamp Distributor for full details.



1 **Instant detection** of breaks in fine wire helps this plant keep production up, costs down. Correct lighting with G-E Mazda Lamps enables even unskilled workers to reduce errors and do more accurate work.

2 **Polished surfaces** often present tough inspection problems. Above, inspection of highly polished machine parts is made easier with low brightness, high footcandle lighting developed with G-E Mazda Lamps.

3 **Safety hazards** can be minimized with high level illumination. G-E Mazda Lamps provide uniform, efficient light sources to help operators see better, faster, more accurately.

4 **Fewer mistakes!** G-E Fluorescent lighting helps to hold shadows at an absolute minimum. It approaches actual daylight conditions with soft, cool, low-brightness illumination.

"To make G-E Lamps STAY BRIGHTER LONGER"
The constant aim of G-E Lamp Research

G-E MAZDA LAMPS

GENERAL ELECTRIC

Hear the G-E radio programs: "The G-E All-Girl Orchestra", Sunday 10:00 p. m. EWT, NBC; "The World Today" news, Monday through Friday 6:45 p. m. EWT, CBS; "The G-E Houseparty," Monday through Friday 4:00 p. m. EWT, CBS.

BUY MORE WAR BONDS . . . AND HOLD 'EM

ARMSTRONG

Answer Manpower Problems with Higher Cutting Speeds

A practical way to compensate in part for the shortage of tool makers and machine operators is to increase the hourly output of each machine tool. This can be done easily, safely and without loss of efficiency on lathes, planers, slotters, shapers, turret lathes and hand screw machines, by taking advantage of the extra capacity offered by the ARMSTRONG TOOL HOLDER System.

With the correct ARMSTRONG TOOL HOLDERS for each operation, speeds and feeds can be stepped-up far beyond those accepted as standard. The "Armstrong System" provides not only highly efficient tool holders for each operation that take standard high speed steel cutter bits, but ARMSTRONG *Carbide TOOL HOLDER* for use with ARMIDE *Carbide-Tipped* Cutter Bits and the new ARMSTRONG CA TOOL HOLDERS which are specially designed for the new (Cast Alloy) ARMALOY Cutters. Both ARMIDE and ARMALOY Cutters increase the length of intervals between re-grindings from 10 to 100 times, and simplify the high speed machining of tough alloy steels, sand-filled castings and "hard-to-machine" metals and materials.

Buy ARMSTRONG TOOLS from your Supply House

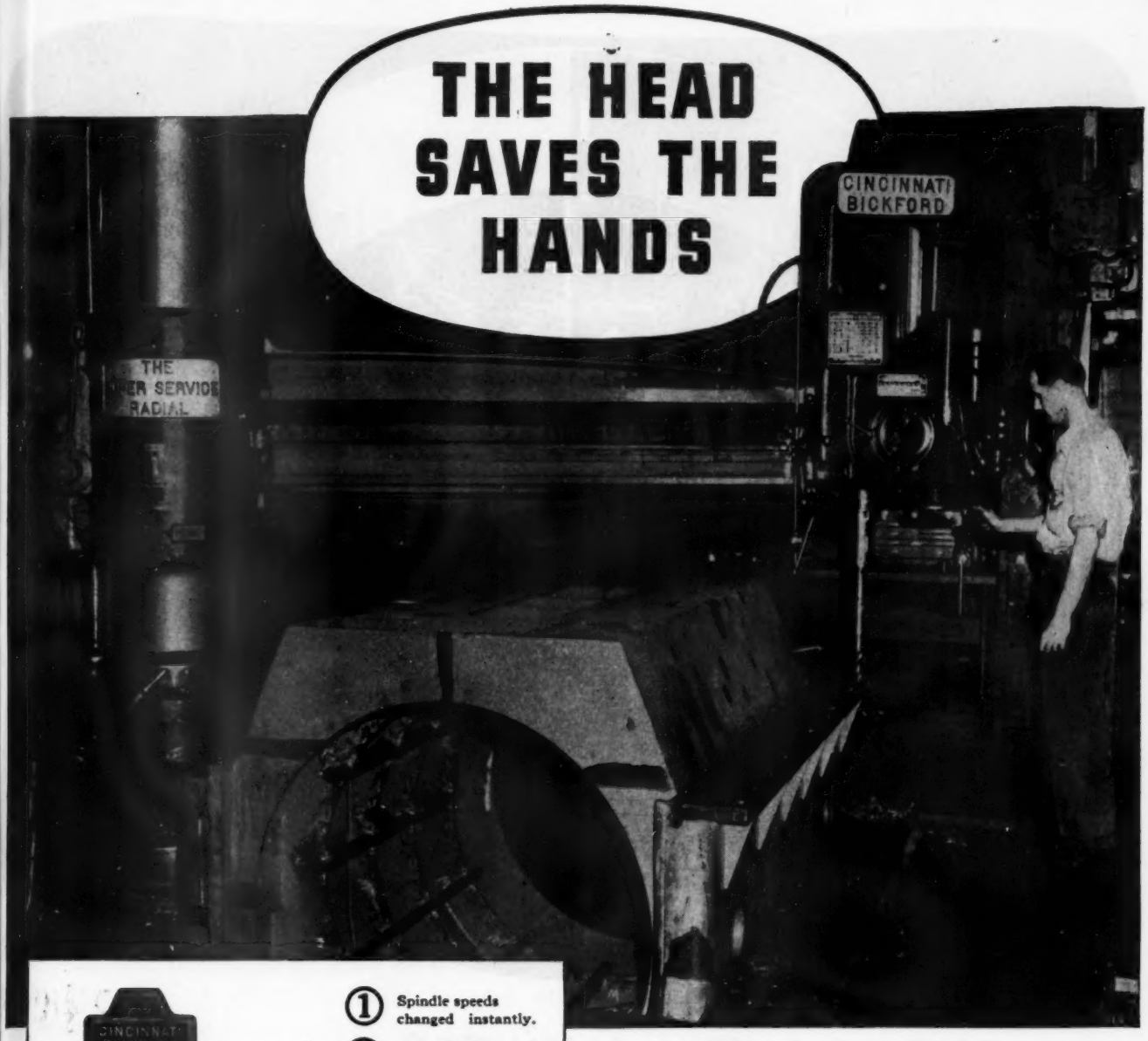
ARMSTRONG BROS. TOOL CO.

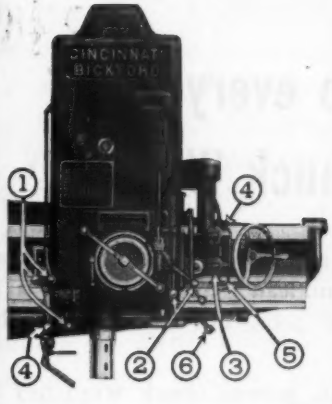
"The Tool Holder People"

315 N. Francisco Ave. Chicago 12, U.S.A.
Eastern Whse. & Sales:
199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. & Sales Office:
1275 Mission St., San Francisco 3, Calif.

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

THE HEAD SAVES THE HANDS





1. Spindle speeds changed instantly.
2. Feed changes instantaneous.
3. Push button power column clamping.
4. Arm elevation and electric arm clamp.
5. Power rapid traverse of head.
6. Start, stop, and reverse spindle lever.

Equal Efficiency of Every Unit Makes the Balanced Machine.

This eight-foot Cincinnati Bickford Super Service Radial Drill is saving time drilling seven holes on each side of this large casting. The job is completed without moving casting. Here again you see how Cincinnati Bickford centralized controls are saving time and operation fatigue.

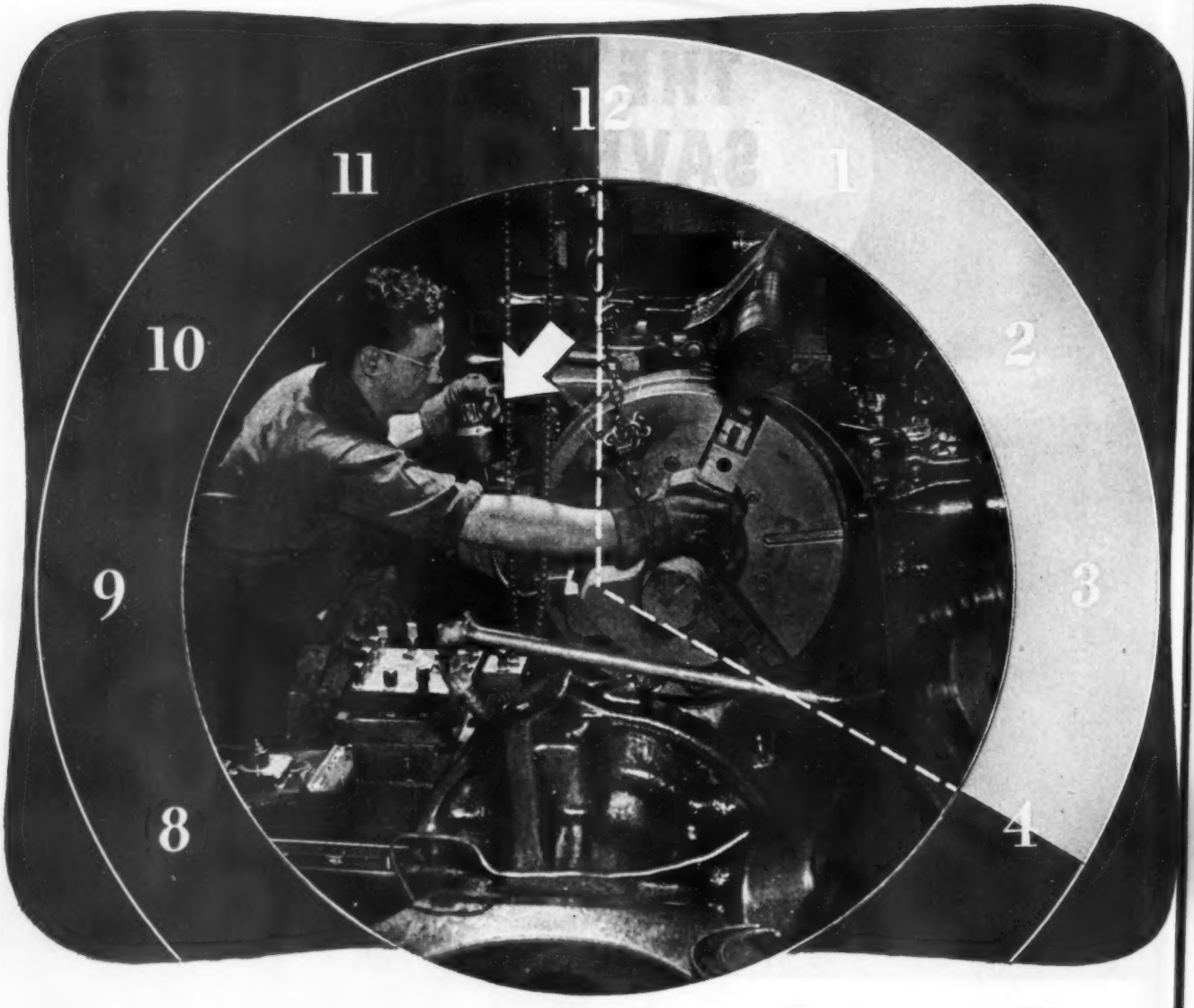
Write for detailed Bulletin R-24 A.

See our condensed catalog in Sweet's File.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

ARMY NAVY

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.



PUT 20 EXTRA MINUTES into every hour with a Warner & Swasey Power Chuck Wrench

IT'S no little trick to take a good machine and a good operator, already working at peak efficiency, and boost production 33⅓%. Yet that is exactly what one company has done by installing Warner & Swasey Power Chuck Wrenches on its Saddle Type Turret Lathes.

By relieving the operator of all heavy straining and tugging, this new attachment saves 20 minutes out of every hour. He simply sets a piece in the chuck, turns a knob—and starts turning.

Power chucking makes work easier, gives more uniform tensions, and can be regulated for a light grip on thin-walled jobs, heavier bites for heavy pieces.

In war production, power chuck wrenches have paid for themselves in as little as 60 days. The savings they'll help you make will be a big factor in peacetime competition. Let a Warner & Swasey Field Engineer tell you how to get more output with a Warner & Swasey Power Chuck Wrench!

WARNER & SWASEY
Machine Tools
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

TURRET LATHES, SADDLE AND RAM TYPES • CHUCKING AND BAR TOOLS
PRECISION TAPPING AND THREADING MACHINES

Three Points Affecting Our Future

America has been a decisive factor in spelling out victory in two wars partly because of our enormous capacity for producing weapons and other goods for ourselves and our allies.

The world will not soon forget that fact. In the next war, if there is to be one, our foes will not give us time to start from scratch and build an arsenal. They will strike quickly and without warning.

They will know that if they can destroy our industries at the beginning, they will be on the road toward winning their objectives.

Not a pleasant thought, admittedly, but one that assumes credibility by the astounding development of the technique of total warfare since 1939.

We must begin *now*, not in 1946 or 1947, to lay out a sound and sensible program for keeping alert after this war against future danger to our national safety.

The first thing that we must do is to retain as "stand-by" facilities a sufficient number of war production plants built the last few years. These plants and equipment will be good insurance against a future emergency.

They will gradually get out of date, of course, but what of it? We began making weapons during this war with plenty of old tools. We were thankful to have them.

Our Army and Navy arsenals and ordnance plants, by virtue of their continuing operation in peacetime, must be maintained in top-notch condition. As new processes and equipment are developed, these plants should adopt them. Appropriations for that purpose should be made by Congress from year to year.

The second thing that we must do is to establish a research program second to that of no other country in the world. The purpose will be to use the nation's scientific and technical personnel and equipment — in government agencies, universities and private industry—to keep us one step ahead of all other countries in developing new weapons and techniques of warfare.

A top-flight military officer states his belief that he would rather have a virile continuous research program in operation than universal military training, so far as preparedness is concerned. We have the beginnings of such research in the newly organized Research Board for National Security. Adequate funds should be made available promptly by Congress to this Board.

The third thing that we must do is to provide stockpiles of strategic and critical materials in this country so that we shall never again be caught short as we were following the Pearl Harbor disaster.

Before the war many Americans thought of this nation as being self-contained, but the falsity of that idea has been driven home to us many times the past three and a half years.

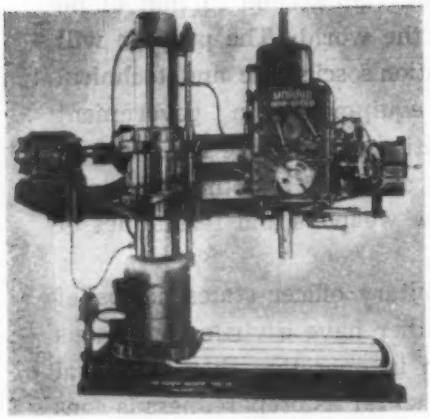
The three-way program just outlined is one designed solely for our self-protection as a nation. In the days of self-propelled missiles, of jet-engine planes, of Japanese balloons, of experimentation in such mysteries as atomic energy and biological warfare, we must be prepared in the years ahead to defend ourselves instantly if we value our families, our homes, our fortunes and our liberties.

Burnham Finney

Tailoring the machine to fit the job . . .

MORRIS

MOR-SPEED
HORIZONTAL 7 UNIT MACHINE

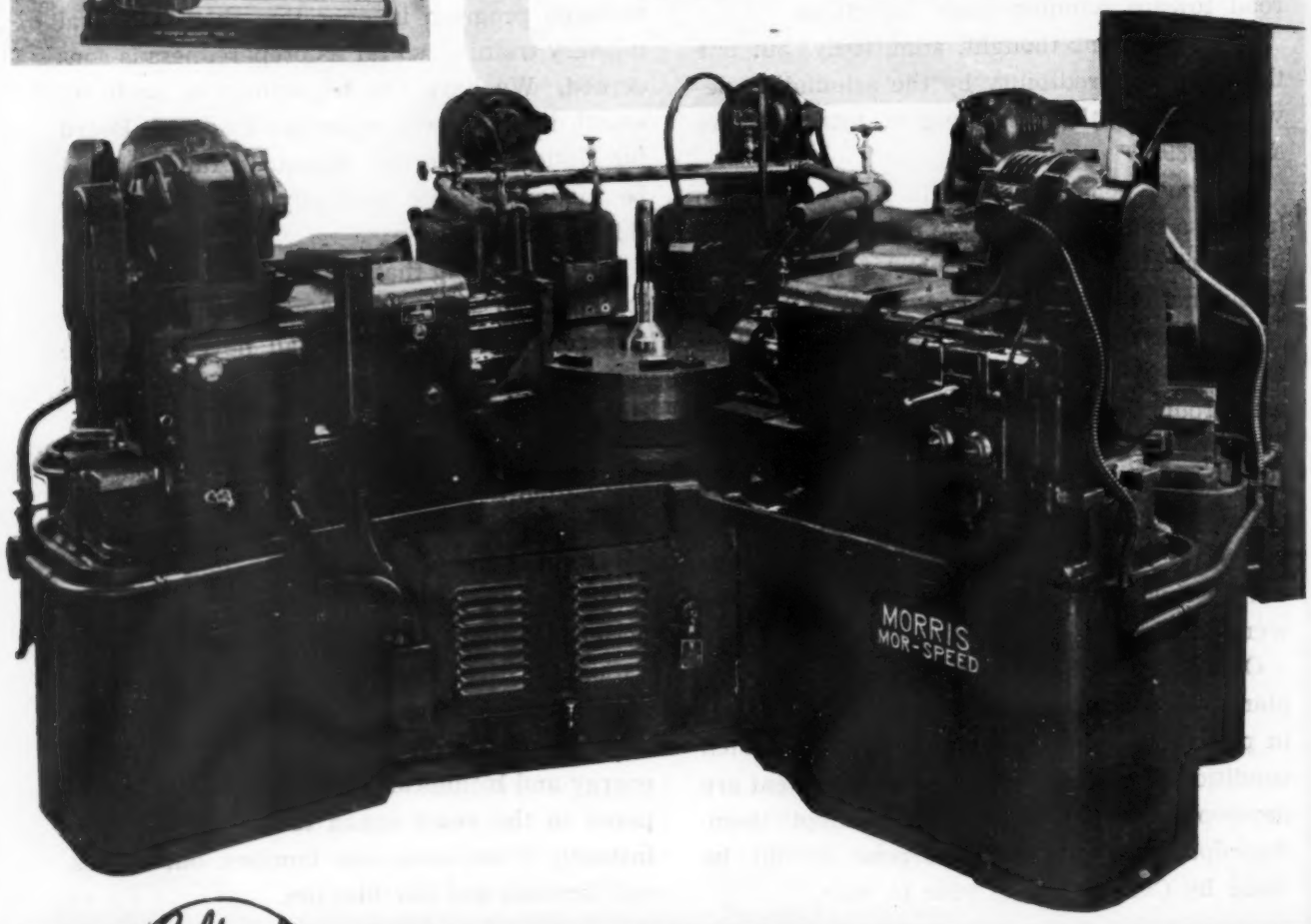


Utilizing standard types of units Morris has developed a wide range of machines for the high production of work requiring accurate drilling—reaming—boring and similar operations.

Here for example is a horizontal machine consisting of 7 hydraulically operated units controlled by a series of push buttons located for convenient operation from normal working position.

The work is a magnesium casting. The seven units contain 21 spindles which drill—ream and counterbore various holes at 18 stations on the work. All operations are completed in one revolution of the work. Indexing is automatic. Work is held in place by means of a hand clamped fixture.

Consult Morris on your high production work of this character—they have the experience—the "know how"—and the facilities to design and develop highly efficient machines for mass production.



Builders of MOR-SPEED Radials

The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

Fundamental Data On Oxyacetylene Cutting Technique

Practical applications of flame cutting have led to refinements which embrace preheating of the metal and improvements in the design of torch tips. This and succeeding articles will review developments in flame cutting

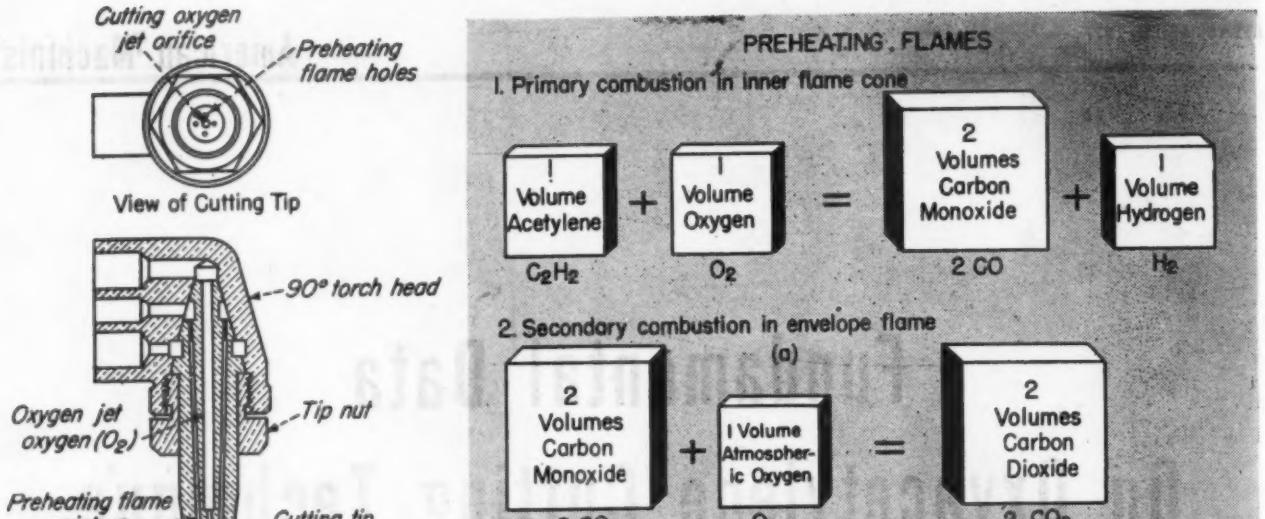
BY DR. G. V. SLOTTMAN
APPLIED ENGINEERING DEPARTMENT
AIR REDUCTION SALES COMPANY

FLAME CUTTING has been widely recognized and adopted as an essentially simple method of severing and shaping steel. This simplicity often tends to overshadow recognition of variables inherent in flame cutting which alter the quality and quantity of production cutting performed in different plants.

No universally applicable rules can be laid down but, nevertheless, the establisment of practical standards within a flexible framework will aid in approaching specific cutting jobs with a method for improving work generally and reducing costs.

The oxyacetylene cutting process is a practical application of the fact that iron, like any other metal, combines with oxygen to form an oxide. In the case of iron, however, the reaction is rapid, self-sustaining and subject to close control. Among the common metals only iron and alloys high in iron can be freely cut with oxygen, a fact for which scientific research has as yet been unable to agree upon a conclusive explanation. A few high-iron alloys cannot be cut, and others can be cut only with difficulty. When iron is heated to its ignition point and brought into contact with oxygen the reaction is actually combustion, so rapid is the rate of oxidation. This chemical reaction is accompanied by the liberation of 2,870 B.t.u. per lb. of iron, and this heat contributes to the continuation of combustion.

In practice a spot area along the line of cut is heated to ignition (about 1,600 F.) by the oxyacetylene preheat flames, and a thin jet of oxygen is then directed at this spot. The jet quickly penetrates through the steel, whereupon the torch is moved along the line of cut. Preheating of subsurface metal is effected by the heat generated by the oxidation reaction below the surface. This heat melts a thin layer of iron, some of which is


Cutting oxygen jet orifice
Preheating flame holes
View of Cutting Tip
90° torch head
Oxygen jet oxygen (O_2)
Tip nut
Preheating flame mixture
Oxygen (O_2) and acetylene (C_2H_2) in equal volumes (approx)
Cutting tip
Direction of cut
Mild steel carbon (C) 0.15-0.25%
Side of kerf
Drag lines
Drag
Combustion of iron
Slag
PREHEATING FLAMES
1. Primary combustion in inner flame cone
1 Volume Acetylene C_2H_2 + 1 Volume Oxygen O_2 = 2 Volumes Carbon Monoxide 2 CO + 1 Volume Hydrogen H_2
2. Secondary combustion in envelope flame
(a)
2 Volumes Carbon Monoxide 2 CO + 1 Volume Atmospheric Oxygen O_2 = 2 Volumes Carbon Dioxide 2 CO_2
(b)
1 Volume Hydrogen H_2 + 1/2 Volume Atmospheric Oxygen $\frac{1}{2}O_2$ = 1 Volume Water Vapor H_2O
Combustion of Iron:
Iron + oxygen = magnetic oxide of iron
$3Fe + 2O_2 = Fe_3O_4$
Analysis of Slag:
A - Magnetic oxide of iron (Fe_3O_4)
B - Other oxides
C - Metallic iron (Fe), 30 to 40 per cent

Chemistry of oxyacetylene flame and of the oxygen cutting process

swept out in molten form by the physical action of the jet. About 60 to 70 percent of the molten iron is oxidized before being blown out, and the liberated heat of oxidation melts the metal immediately ahead in the line of cut. The preheating flames must be maintained at the top surface to overcome the thermal deficiency at the upper level, caused by the fact that the heat of oxidation of this metal is not liberated at this level, but at a somewhat lower level because the reaction is not instantaneous. Further, these flames are needed to melt the surface mill scale or rust which could not be penetrated by the oxygen jet alone.

Theoretically the oxidation of one pound of iron from the kerf requires 4.61 cu. ft. of oxygen. Actually, however, about 30 to 40 percent of the metal is washed out in the molten or unoxidized state. The oxygen consumption per pound of iron removed is therefore 30 to 40 percent less than the theoretical figure. This should be taken into consideration in any cost estimates made in advance of cutting when such estimates are based upon oxygen required to remove metal from a kerf of a certain width, height and length. Cognizance should also be taken of the fact that some of the oxygen consumed is drawn from the surrounding atmosphere.

Alloying elements in cuttable steels may be either oxidized or carried away in the molten state in the liquid slag without hindering the cutting process. However, certain elements, such as chromium and nickel, which may not appreciably interfere with cutting if present in small to moderate quantities, have a marked retarding effect on the oxidation reaction when present in large amounts. Some of these high-alloy steels cannot be cut by ordinary methods, while others are susceptible to cutting by special techniques.

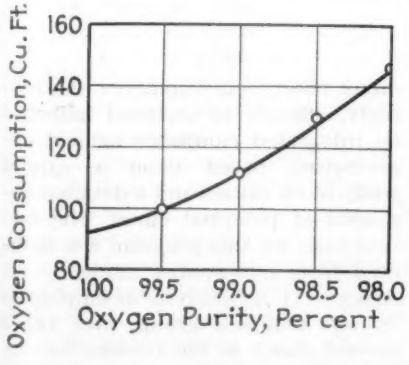
The speed of the oxygen stream is in the range of 1,000 to 1,500 ft. per sec.—approximately the speed of sound. At these high velocities

Different sizes and styles of cutting tips have varying diameters of orifices and number of preheat flames. There is a tip for every thickness, composition and surface condition of steel to be cut, as well as specially shaped tips for special cuts

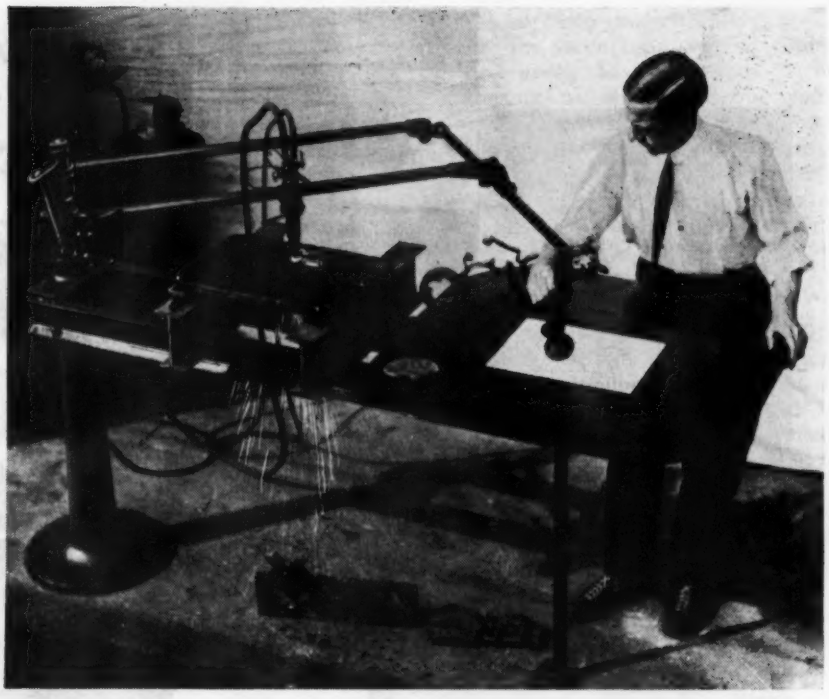
the jet issuing from the standard torch tip has standing waves of high and low pressure areas, the form of which are influenced considerably by the length of the orifice channel, the size of the relief chamber above this channel, and by the shape of the approach from the chamber to the channel. Considerable research has been done on the effects of these relationships upon the type of cut produced, and present-day cutting tips are the product of this research. The recently introduced high-speed, divergent nozzle tips are designed to eliminate high and low pressure areas or expansion and contraction in the oxygen jet, producing a stream having parallel sides and cutting a narrower kerf.

Basic Design of Tips

The basic design of all cutting tips comprises a central orifice for the cutting jet, surrounded by a number of orifices for the preheating flames. Tips are made in sizes ranging from 00 to 18, the diameter of the cutting orifice increasing with the size number, for cutting thicknesses of steel ranging from very light to very heavy. The tips vary also in the number and size of preheat orifices since a greater intensity of preheat is needed for cutting the heavier thicknesses and for penetrating through scale and rust at the surface. Thus any specific size number of tip will be made in a variety of styles, with light preheat for cutting clean steel, medium preheat for steel having average conditions of scale or rust, and heavy preheat for very scaly, rusty, painted steel, or for cutting cast or forged steel. In addition, special tips are available for such purposes as washing out rivets, cutting risers, cast iron, and for gouging and scarfing.



Average consumption of oxygen of various purities required to cut various thicknesses of steel, using 100 cu. ft. of 99.5 percent pure oxygen as the basis of comparison. Note the rapid increase in volumes of gas required as the purity decreases



This early Oxygraph was the first machine designed to cut irregular contours. Its pantograph arrangement required a templet twice the size of the finished workpiece. This machine broadened the scope of oxyacetylene cutting immensely, giving it jigsaw flexibility

For straightline cutting without changes in direction a single preheat flame in advance of the cutting stream and one flame directly behind, would be sufficient. But since most cutting involves changes in direction of motion of the torch, it is necessary to surround the cutting jet with preheat flames to insure at least one flame in advance and one behind the jet at all times. Thus standard tips have four, six or, in the very large sizes, eight preheat flame orifices arranged in a circle around the central orifice.

Purity of Oxygen Essential

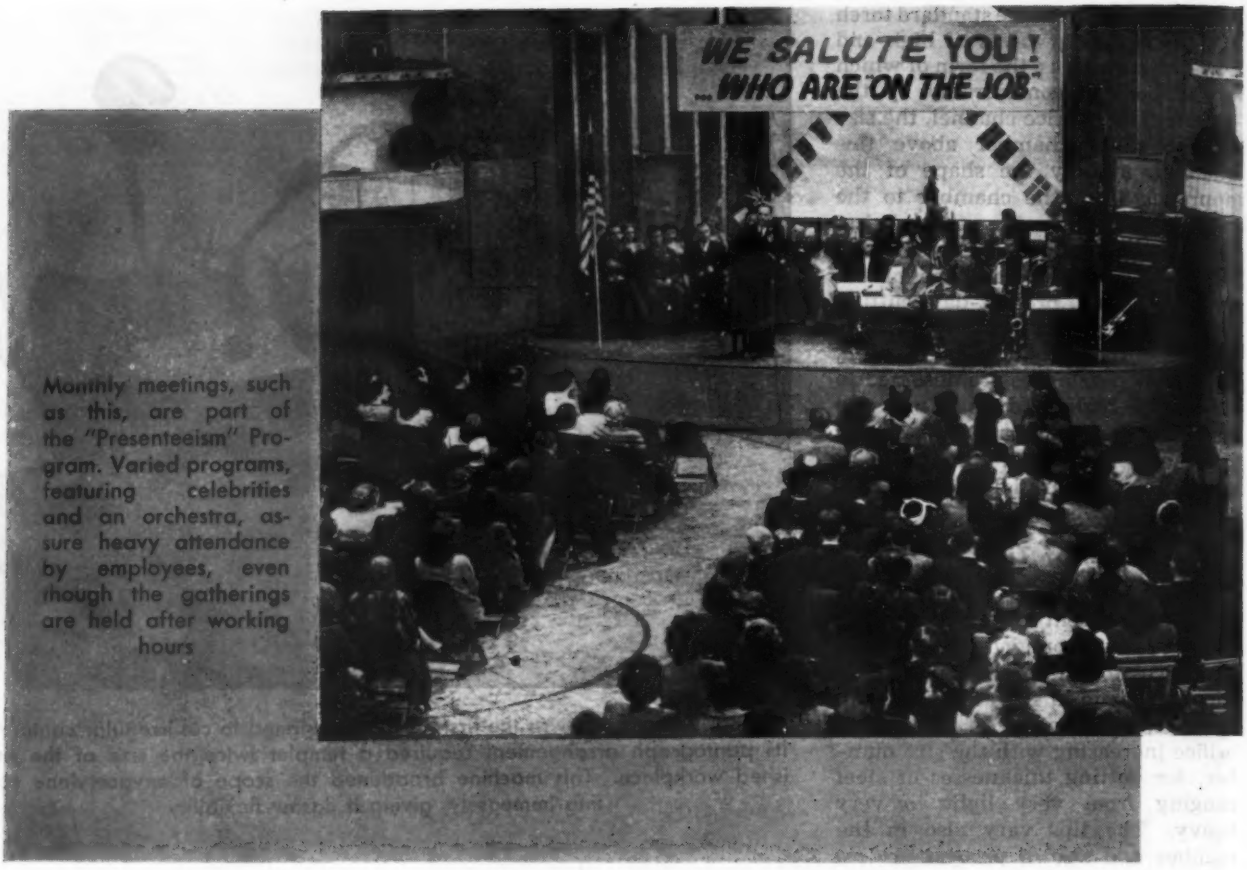
Efficiency and economy in cutting require that the oxygen be of the highest commercial purity obtainable. Controlled experiments have shown that a reduction in purity of only ½ of one percent, from 99.5 to 99.0 percent, reduces the efficiency of cutting by almost 12 percent. A reduction from 99.5 to 98.5 reduces the efficiency by 29 percent. Most commercial oxygen today is of 99.5 percent purity.

In gas welding, the oxyacetylene flame may be adjusted to be somewhat oxidizing, reducing, or neutral, according to need. The neutral condition is reached with a mixture of about 1.1 volumes of acetylene to 1 of oxygen. In oxygen cutting, however, an oxidizing flame can be used if desired, since at a ratio of about 1.7 to 1 the flame reaches its highest temperature. Superficial oxidation of surface metal is of no concern in cutting, the object being to preheat the surface as quickly as possible. It is for this reason, principally, that acetylene is the preferred fuel gas for preheating in cutting. In combination with oxygen it produces a flame temperature upwards of 6,000 F. Hydrogen, city gas, propane and other petroleum distillates are occasionally used, but these gases all produce a lower flame temperature and are consequently slower heating, requiring appreciably larger volumes of oxygen to approach acetylene in efficiency.

The high cutting efficiency of acetylene in combination with its portability, safety in handling and availability represent the major factors in its choice as the universal source of heat for various flame-cutting operations.

Other gases, although sufficiently high in B.t.u. content to offer advantages in this respect, are inferior to acetylene in the economical production of flame-cut parts.

The second article in this continuing series will discuss manual torch operations.



Monthly meetings, such as this, are part of the "Presenteeism" Program. Varied programs, featuring celebrities and an orchestra, assure heavy attendance by employees, even though the gatherings are held after working hours

The Army Curbs Lost Man-Hours With a "Presenteeism" Program

BY MAJOR EDWARD D. WHITE,
PACIFIC OVERSEAS AIR TECHNICAL SERVICE COMMAND

MILITARY UNITS employing civilians have faced the problem of absenteeism, as private industry has, and sought all possible means of coping with this menace to production schedules. Among those units which have made great strides in combatting absenteeism over the past year is the Pacific Overseas Air Technical Service Command, Oakland, Calif., which has developed a "presenteeism" program that has curtailed absenteeism in all of its installations from Tacoma, Wash., to Long Beach, Calif.

One of the most important military installations on the West Coast, POATSC prepares for overseas shipment all Army Air Forces material going to the Pacific battle zones. Since 70 percent of the work force is civilian, the Army cannot afford a high rate of absenteeism which might affect these shipments. Accordingly, officials at Oakland launched an integrated campaign against absenteeism, based upon a careful study of its causes and a detailed appraisal of potential cures. The factual basis for this program was gathered from two studies made by the Army: (1) an analysis of employees by age and sex group; and (2) a careful check of the reasons for absenteeism and job terminations.

The POATSC cuts down labor turnover and absenteeism by first pinning down the causes and then seeking cures. Novel ideas and flexibility maintain worker interest at high level

Employee Cross-section

About 73 percent of POATSC civilian personnel are female. Of these, about 58 percent are under thirty years of age, and a further break-

down showed that 19 percent of all women workers are between 22 and 25 years of age and 25 percent are under 21 years old. Only 38 women employees were over 60, and one of them was over 80. In the male employee group (comprising 27 percent of civilian personnel) more than 52 percent were over 50 years old.

Most of the civilian employees were inexperienced in Army procedures and the type of work necessary to accomplish the mission of the Command. Moreover, many of the young girls, comprising such a large percentage of the workers, had never worked before. Accordingly, an intensive program of training and indoctrination was initiated and the importance of each job in supply, maintenance and shipping was impressed upon the workers. Even with the distractions of metropolitan San Francisco ever present to the large number of "out-of-town" young girls, the training program had a decided effect in maintaining a good "presenteeism" record by stressing the need for "manning the battle stations" on the home front.

But the training program alone could not be expected to cure absenteeism. What made absenteeism more serious was the fact that a critical manpower shortage existed in this area. Thus, new employees could not be found to augment the staff, and long hours of overtime did not offset the man-hours lost due to absenteeism.

Absenteeism Study

The Army's study revealed these causes of absenteeism and job turnover:

1. Chronic, one day off, rest up
2. Physically below par
3. High wages and little time to spend extra income
4. Personal illness
5. Bad nutrition
6. Lack of child care
7. Illness in the family
8. Wives visiting husbands in military camps
9. Bad weather conditions
10. Taking time off as allowed for sick and annual leave under Civil Service provisions
11. Switching jobs for higher pay
12. Lack of shopping facilities
13. Housing conditions
14. Emergencies
15. Home difficulties and children
16. Transportation
17. Out-migration

Some of these causes were matters of morale, others were due to conditions beyond the worker's control. The Army directly attacked these various causes. Items 13 and 16 were rectified by obtaining housing for employees nearer to the job, by share-the-ride programs, and, where possible, by shifting the worker's place of employment. A Housing Bureau was established to locate houses and rooms for employees, thereby reducing the number of lost-days in "house hunting."

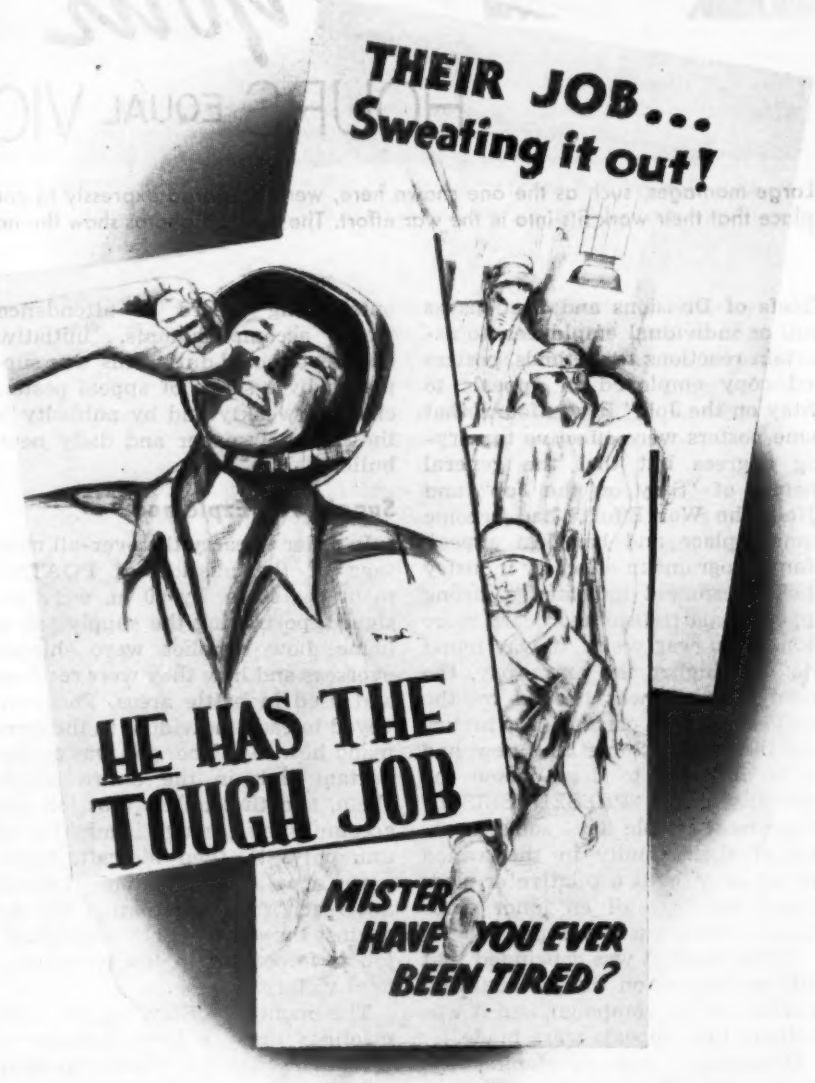
Items 1, 2, 4 and 5 were aimed at by institution of a visiting nurse service and a drive to correct bad nutrition and keep more people on the job. Using the slogan "Eat Well to Keep Well," employees were urged to eat in the civilian post restaurant where a balanced meal could be obtained at very low prices. In addition, workers were asked to eat certain foods regularly to insure proper nutrition. These steps aided morale and reduced the number of one- and two-day absences.

At the same time, special courses were given to supervisors in the handling of complaints, personnel management and job management to maintain high morale and job interest. Civilian counsellors had confidential talks with chronic absentees and with those who made a habit of being late for work.

Morale a Factor

The balance of the causes which resulted in employee absenteeism and job turnover were largely questions of employee morale, except for emergencies about which little could be done. Accordingly, a morale-building campaign was developed.

Discussions were held with the Civilian Personnel Branch and with



Simple, but effective posters, such as these, are posted at time-clocks where civilian employees of the Pacific Overseas Air Technical Service Command are able to see them several times a day. Changed weekly, the brief messages are conveyed at a glance, while the worker is punching the time clock

Large montages, such as the one shown here, were prepared expressly to convey to Service Command employees the place that their work fits into in the war effort. The merged photos show the necessary steps in getting supplies overseas

Chiefs of Divisions and Sections as well as individual employees, to ascertain reactions to methods, posters and copy employed in appeals to "Stay on the Job." It was found that some posters were effective to varying degrees but that the general themes of "Stay on the Job" and "Help the War Effort" had become commonplace and had lost appeal. Many programs in effect by industry and government indicated a strong appeal to patriotism and "earn more money" in war work. It was found that the higher the extra pay, the more time off was needed by the worker to spend earnings for luxury and like items. Something new had to be initiated to drive home the necessity of "PRESENTEEISM." Since most people have some member of their family in the armed forces, or at least a relative or close friend, the idea of an inner emotional appeal was developed.

At the start, it was concluded that only employees on the job could be reached by the campaign, and it was to them that appeals were made.

Originating and developing the program, the Public Relations Office, with full support of higher officials, inaugurated mass meetings to honor the monthly "Stay on the Job" winner in each division who had the outstanding record of attendance, work accomplishments, initiative and devotion to duty. This was supported by a series of appeal posters changed weekly and by publicity in the post newspaper and daily news bulletin.

Supply Job Explained

In order to carry the over-all message of the mission of POATSC, montages 40 in. by 60 in. were designed, portraying the supply job at home, how supplies were shipped overseas and how they were received and used in battle areas. This conveyed to each individual in the command how his or her job was an important link in the entire supply chain, and that unless that job was accomplished (though it might seem unimportant) then aircraft, repair parts, supplies and equipment would not reach their destination for use against the enemy. Each individual's job is important in the winning of final victory.

The monthly "Stay on the Job" meetings drew a large number of civilian as well as military personnel. They were held after normal working hours and no man-hours were lost. Featured by personal congratulations and a letter to the winners by the Commanding Officer, the program was livened by band music, the appearance of a celebrity, and short speeches by the Commanding Officer, a returned war veteran and a representative of the civilians. The programs were varied each month so that an interesting war film could be a highlight.

Of major importance in the Presenteeism Campaign were the time clock posters which were changed weekly. They conveyed a timely thought and the message was seen every time the clock was punched. Every Monday morning, all employees were confronted with a new poster. Interest was never allowed to drag.

The over-all campaign produced highly gratifying results with the absentee and quit rate dropping sharply. New ideas are constantly being injected into the campaign to keep the battle stations manned until Japan has been defeated.

Since victory on the battlefields begins in the aircraft plants, the shipyards, the ammunition factories and the home front military installations, the POATSC is doing its best to insure that excessive absenteeism within its jurisdiction is not allowed to break the vital chain in the shipment of supplies to the Pacific. This is a continuous battle.

Production Planning for a Rubber-Press Department

BY EDWIN H. SCHAEFFER, DIRECTOR OF INDUSTRIAL ENGINEERING AND WALTON HUGHES, INDUSTRIAL ENGINEER, LINDEN PLANT, EASTERN AIRCRAFT DIVISION, GENERAL MOTORS CORPORATION

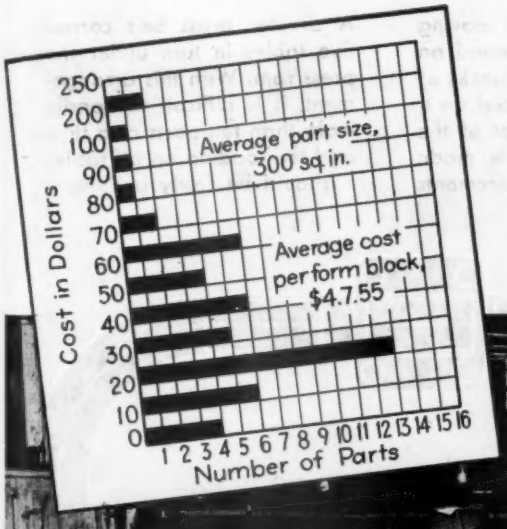
THERE ARE several economic advantages in using the rubber press for forming aluminum parts, in comparison with the brake press, crank press or drop hammer. The chief of these is the extremely low cost of the tooling. And since the die or form block is subject only to compressive stresss, it need not be designed to resist shock. Consequently, low-cost materials, such as low-grade steels, Kirksite, cast aluminum alloy, and Masonite can be used for the tools. Metal form blocks are required when finish hammer-forming is done on the conveyor.

Attracted by low tooling cost, many concerns are interested in forming aluminum by the rubber-press method. This timely article discusses the economics involved

Low tooling labor cost is another advantage of rubber-press operation. Set-up cost is likewise negligible because the operation is merely that of placing the form block on the feed pallet. So, in cases where it is urgent to get into production rapidly, the simplicity of rubber-press tooling allows completion of production tools in a fraction of the time normally required for more conventional forming methods.

A considerable variety of parts can be formed on the rubber press during the same shift. This circumstance permits a smooth flow of material and contributes to a relatively low inventory.

A further economic advantage of rubber-press tooling is that the loss per tool is small when engineering



Left—From a study of 51 form blocks for a comparatively simple component, it was found that most of them cost between $10 and $70. For more complex items, the cost may be doubled

Below—To reduce critical manpower requirements, a new layout was made for the rubber-press department. In the course of this work, there was developed a continuous conveyor of the elliptical roller-skate wheel type for feeding loaded form-block pallets to the press. Output is practically doubled by this application of automotive experience to making aircraft parts

changes and product obsolescent occur.

There are three disadvantages, however, in connection with rubber-press forming—cost of equipment, high direct labor cost per piece, and difficulty of establishing a production-line layout. Equipment costs vary with the sizes of parts run, pressure requirements and production volume. Approximate costs of presses, including installation, are: 1,000-ton press 2×4 ft. bed—$12,000; 2,500-ton press with 3×6 ft. bed—$55,000; and a 5,500-ton press with a 5×8 ft. bed—$180,000. In addition, a feed system costing $5,000 to $20,000 is advisable.

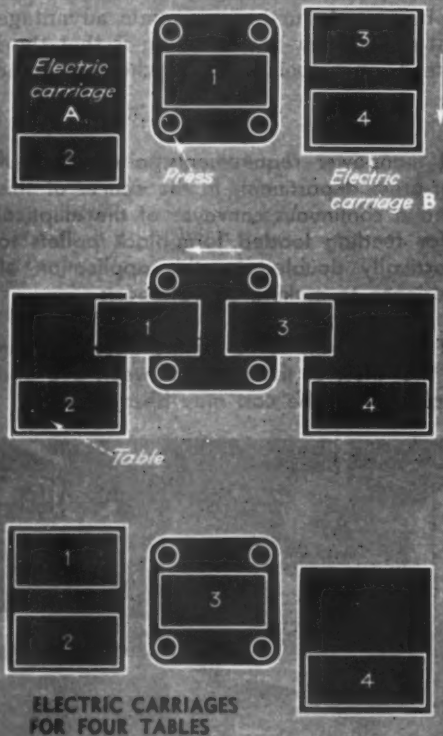
The direct labor cost per piece depends upon the number of men operating the press. In the case of the set-up now used at the Linden plant, ten men are required as a minimum to operate the system. If all stations are manned, the direct labor cost per piece drops to about 1/50 of the hourly operator rate.

It is almost impossible to achieve a true production-line layout for a rubber-press department. It is impractical to invest in a sufficient number of presses to allow location of one of them in each possible production line. Hence, parts ordinarily flow to one or more presses.

In comparing the major costs of forming parts in the rubber press against the cost of forming parts by other equipment, the following approximate formula is useful:

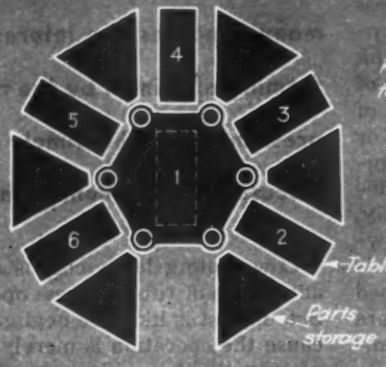
$$C = \frac{E-R}{V} + \frac{T}{P} + F \times L \div \frac{S H V}{N}$$

TYPICAL PALLET-FEEDING SYSTEMS USED FOR RUBBER PRESSES



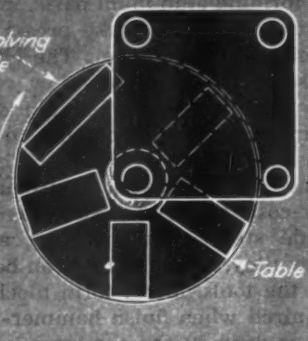
ELECTRIC CARRIAGES FOR FOUR TABLES

To minimize the time lost in getting four tables into and out of a two-sided press, electric carriages can be used. The cycle is in part: upper view—table 1 is in press; carriage B moves so that table 3 registers with the press bed; center view—table 3 enters the press as table 1 leaves, lower view—carriage A moves to register table 2 with press bed, while table 3 is being pressed



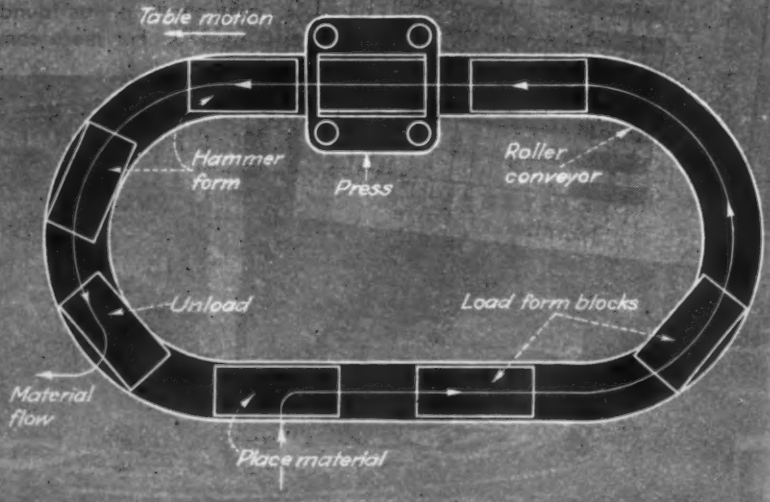
HEXAGONAL PRESS WITH SIX RECIPROCATING TABLES

For high production, six moving tables are arranged around an hexagonal press. Form blocks of similar nature are grouped on a specific table. Movement of the tables under the ram is made to suit production requirements



CIRCULAR PRESS BED FOR TABLE FEED

A circular press bed carries five tables in turn under the press ram. With this arrangement, it is difficult to handle more than ten parts at a time and the loading on all tables should be fairly uniform



CONVENTIONAL ELLIPTICAL CONVEYOR SYSTEM FOR TABLES

An elliptical conveyor system is a satisfactory method of transporting tables to the rubber press because: (1) Little time is lost in getting tables into and out of the press, (2) plenty of work area is available for operators, (3) finish hammer-forming can be done while the parts remain on the form blocks

where

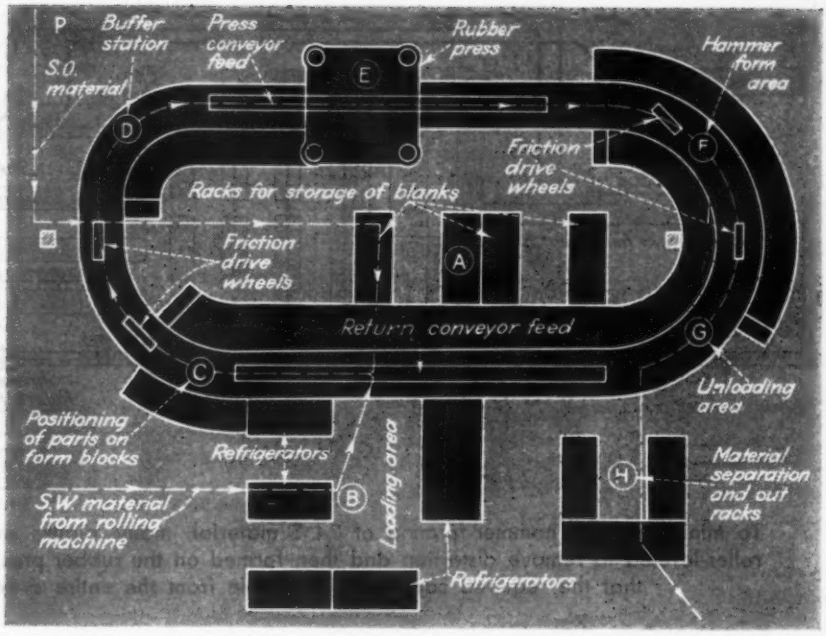
C = total cost per piece in dollars
E = equipment cost in dollars
V = total production volume in pieces
T = tool cost in dollars
P = total parts to be produced from tools over their life
L = direct labor cost per piece
H = average set-up time in hours
N = lot size per set-up
F = direct labor plus factory expense burden to direct labor in percent
S = cost per hour for die-setting labor
R = resale value of equipment

Aside from these factors, consideration must be given to the effect of the method of forming on the cost of subsequent operations. For example, the rubber press may form a complex part in such a manner that excessive hand work is required to finish the piece, whereas it can be made perfectly in a crank press fitted with a positive form die.

The rubber press operation follows preliminary operations such as shearing, stack drilling, routing and tumbling, and it is closely associated with heat-treating and hammer-forming. Therefore, the cost of the rubber-press operation, heat-treating and hammer-forming are interrelated in some instances, because of the technological factors involved in the metallurgy of aluminum. In some cases the three operations must be considered in the whole.

The selection of rubber-pressing equipment for a given plant can be made only after a thorough study of the production requirements. Among the factors to be investigated are:

1. Maximum size of part to be formed. The press bed dimensions must be greater than the greatest length and width of parts to be made.



In adapting the elliptical conveyor system to production of 150,000 pieces monthly (250 each of 750 different parts), power feed is employed to move pallets into and out of the press. Independent conveyors move pallets past work stations served by up to 18 operators. With this arrangement 150 different parts of average size (1½ sq.ft.) can be in process and a balance is kept between S.O. and S.W. material

2. The complexity and thickness of parts determines the pressure rating of the machine required. In straight flange forming of thin material (0.025-0.062 in.) pressures average 1,000 to 1,200 lb. per sq. in. and the maximum pressure is around 2,000 lb. per sq. in.

3. Annual production requirements must be estimated and converted into a production load of number and area of parts to be formed on the rubber press. Consideration must be given to peak daily requirements and average daily requirements, both in respect to number and area of the parts so that an economical choice of press and auxiliary equipment can be made.

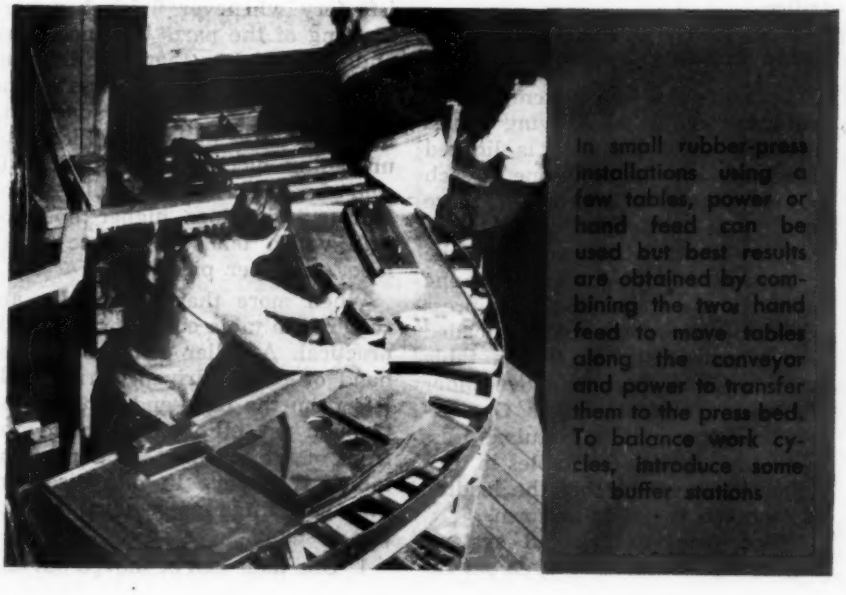
The production capacity of a press is determined by several factors:

1. Area per minute. The number of square feet of table area that can be pressed per minute, or the number of strokes that can be made per minute times the table area in square feet. Table areas vary from 8 to 64 sq.ft. and press strokes from 2 to 3 per min.

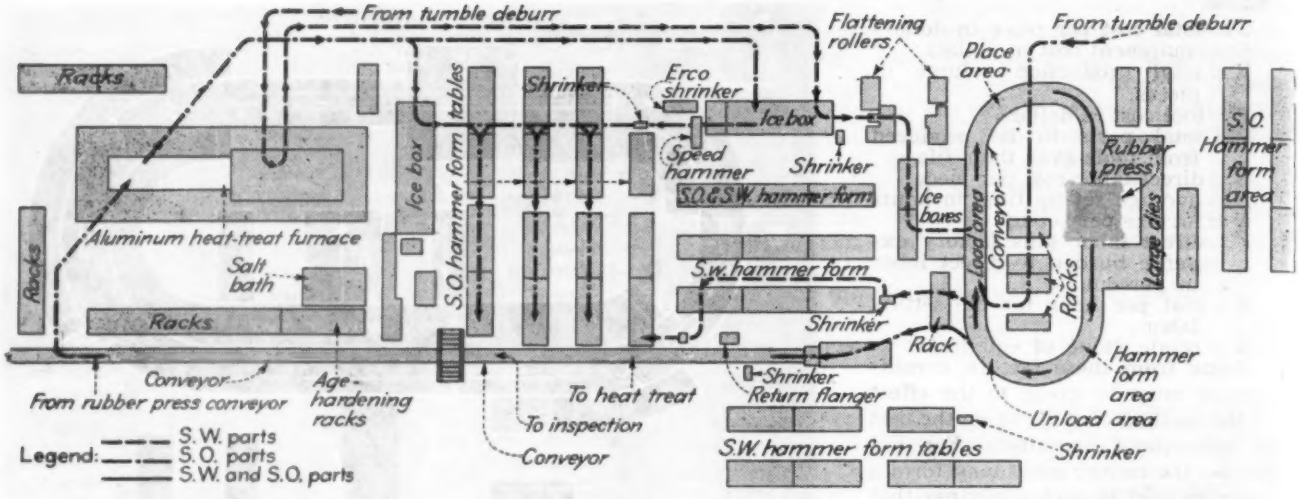
2. Block loading and feeding time. Time required to move material into and out of the press reduces the press capacity. Because feeding the form blocks into the press is inefficient, the work is usually prepared outside the press and moved into place on sliding tables. An efficient table system requires as little as three seconds of press loading time. But the average press feed system may need more than 50 percent press loading time.

3. Machine efficiency. With irregular production schedules such as are usually found in aircraft plants, plus strict limits on quality, it is difficult to hold production above 70 percent of actual machine capacity.

4. Table loading. The form blocks are often larger than the parts, and space must be allowed between the blocks to allow for flow of rubber.



In small rubber-press installations using a few tables, power or hand feed can be used but best results are obtained by combining the two: hand feed to move tables along the conveyor and power to transfer them to the press bed. To balance work cycles, introduce some buffer stations



To minimize finish hammer-forming of 24 S material, many blanks are heat-treated to the SW condition, roller-leveled to remove distortion and then formed on the rubber press. All equipment has been balanced so that the required capacity is available from the entire system when operating as a unit

Thus the blocks cannot be arranged for perfect compactness.

These facts reduce the effective table area to 50 percent of the actual area. To balance equipment capacity and requirements, the above factors should be related in the following manner:

$$\frac{0.8R}{60} = 0.35A\ (C + F)$$

where

R = total area in sq.ft. of production parts required per hour to maintain peak production

C = press stroke time cycle in minutes

F = feed time in minutes

A = table area of press in square feet

No time is allowed for set-up because practically no set-up is involved. The left-hand side of the above equation represents 80 percent of peak requirements and should be as nearly as possible equal to the right-hand side of the equation representing normal capacity.

The output of rubber-press departments depends upon the type of feed system and auxiliary equipment supplied. The simplest type of feed system is one in which the form blocks are placed on the stationary press bed. Parts are then loaded and unloaded by the operator. The loss in operating time for loading and unloading may run as high as 90 percent and there is danger involved to the loaders who must work under the press ram.

To speed up production and eliminate danger, two or more movable bolster plates, generally called loading tables or pallets, can be used. These are so arranged that when one table is moved under the press the other is moved out for loading and unloading. A track and mechanism for moving the bolster plate into exact position under the rubber container must be provided.

The need for still higher production has given rise to the design of a variety of systems of movable loading tables. One example is an hexagonal press having six loading tables which move in turn under the ram heads. The ram revolves in order to adjust itself to the particular table to be used next and, as the choice of tables is selective, a wide range of forms can be produced. Forming blocks of similar nature are grouped on each table so that the loading and unloading of each table can be timed to fit a definite sequence of press strokes. Work tables are located between the loading tables.

Table Loading System

Between these two extremes there are other plans for moving tables into the press. If space is limited two tables may be used, one at each end of the machine, but if more room is available, additional tables may be employed. In any case the arrangement should be such that one table will always be under the press while the others are being unloaded and reloaded, and so that a table will always be ready to move under the press as another leaves. One example consists of a circular press bed which carries five tables in turn under the press so that the loading of each can be fairly uniform.

When using table feed systems employing four, five or even six reciprocating tables, a time lag is encountered while one is being fully retracted and before the next can start into the machine. Use of these feed systems reduces operator production efficiency by the reciprocal of the number of tables used. To overcome this loss, a system using two table carriages has been devised. Many aircraft plants have adapted this system but it is mechanically complicated and limits the number of operators to six and the number of tables to four. When using reciprocating table arrangements, all operations must be performed by the same workers. Thus operator training is complex and costly.

There are several systems which make provision for operator specialization. The rotary system having five tables on a plate pivoted about one corner of the press has been satisfactory whenever finish hammer-forming of the parts is unnecessary and where fewer than ten different parts are required in process at one time. With this system operators may specialize in loading blocks or unloading blocks. This small division of work eases the training problem and develops higher operator skill which tends to reduce direct labor costs per piece.

When more than five tables are required, a table conveyor system is practical. A roller conveyor, either hand or power driven, carries pallets from the back end of the press through an elliptical path to the front of the machine. Motion of the tables is always in one direction. There are three major advantages of this system:

1. One table can be moved out and

another into position at the same time. And, therefore, no loss of time is encountered by table interferences.

2. A large work area is available for the operators.

3. Operators can specialize in various work areas. Finish hammer forming can be perfomed while the parts are still on the form block and as soon as the table leaves the press. At the next work station the parts are unloaded from the form blocks by specialized operators. At the third work station new blanks are placed on the proper pallets and the fourth work station is used to locate the blanks accurately on the form blocks.

Tables may be moved through the conveyor system by hand or power or a combination of these two. When using a small press, best results are obtained by means of a power feed at the press and hand movement of the part along the conveyor. Because many operations are taking place at once, it is advisable that the table should move somewhat at the will of the operator so that he will not have to wait for the press stroke or for other people. The space on the conveyor between operators is used for buffer stations for additional tables, so as to adjust any temporary lack of balance between work cycles of the various groups. Tables as large as 9 sq.ft. in area can be moved by hand.

An ideal press system for a plant with a large variety and large volume of rubber-press production (750 parts, 200 of each, or 150,000 parts per month) employs a through conveyor system of the elliptical roller-skate wheel type with power feed to drive the pallet into and out of the press. Independent power drive systems are also used to move the pallets through the various work stations.

A continuous chain conveyor about 18 ft. long with special dogs designed to pick up lugs on the underside of the pallets is used for the press feed mechanism. To obtain quick pallet movement without jar and shock, and thus to avoid disturbance of parts on the form blocks, a hydraulic system is employed to drive the sprockets. Controlled acceleration and deceleration of the conveyor system and pallets are obtained by a back-pressure metering valve, which is cam operated. The system operates intermittently between press strokes, to carry the load into the press at the same time as one is taken from the machine.

The pallets are driven around the ends of the elliptical conveyor by friction-driven rollers and back over the straight return section by another chain and dog system. The operations of loading form blocks, unloading them, placing blanks on the pallets, and finish hammer-forming of parts on the form block is performed in separate work station areas along the conveyor. Thus, it is possible to break the work down into four distinct categories, and operator skill may be developed to a higher degree in a short time. Space is available for upwards of 18 operators around the conveyor. Ample room is provided for the loading of parts from racks and ice boxes.

Many Parts in Process

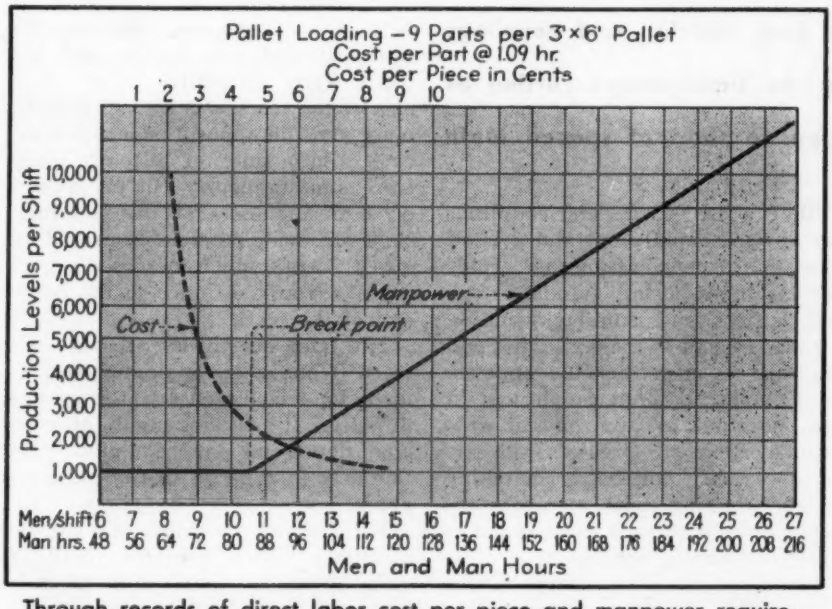
The material handling and flow are simple. A concentrated loading point allows placement of S.O. parts from racks on the inside of the elliptical conveyor and simultaneous loading of S.W. parts from an ice box which is located outside the conveyor ellipse and directly opposite the S.O. part racks. As many as 150 different parts may be in process on the conveyor at the same time. The storage racks and ice boxes are designed to make this possible.

Two groups of operators service sections *A* and *B* of the department layout in the Linden plant. It is their duty to select the blanks corresponding to the form blocks on each pallet as the pallet moves past on the conveyor. There are usually from six to 12 different parts on the pallet. At station *C* the operators position the individual blanks on the form blocks, and the pallets move to a buffer station *D* and wait for completion of the press cycle. Pallets are then fed into the rubber press *E*, where the blanks are formed. The pallets are then removed from the press by the same feed mechanism.

At this point the pallets are moved to the hammer-form work station *F* by friction drive. Here they are stationary while operators finish hammer-form the pieces, after which the friction drive moves the pallets to the work station *G*, where the parts are removed from the form blocks and segregated on racks *H*. Finally the pallets are recirculated continuously through the system. Thus, each 6 min. cycle around the conveyor results in the forming of one part from each form block on each of the pallets.

The system described operates with 20 pallets of 3×3 ft., and these are fed into the press two at a time. A switch system permits feeding pallets of 6×3 ft. when larger parts are formed.

To coordinate pallet locations of form blocks and location of material in stock racks and ice boxes and to balance work station loads, it is desirable to work out forms which permit advance planning on a daily basis. Pallets, ice-boxes and bins are numbered to correspond to the numbers appearing in the form, thus giving a clear picture of the parts in process at all times. It is best to group parts to be formed in sets of similar shape and metal thickness and distribute one part of each type into each scheduled period so that the different periods will be as nearly alike as possible.



Through records of direct labor cost per piece and manpower requirements for loading pallets, it is possible to calculate the cost of operating the through-feed conveyor system at various production loads

Clutches and Couplings PRODUCED RAPIDLY ON Standard Gear Machine

Fig. 1—A design of coupling which has been applied with success to built-up crankshafts, such as are used on large aircraft engines. It contains teeth of constant depth and is flexible in relation to the pressure angle

BY ERNEST WILDHABER, GLEASON WORKS

Better finish and greater load carrying capacity are imparted to face clutches and couplings by the simultaneous cutting of opposite sides of spaced teeth

CURVIC CLUTCHES and couplings can now be rapidly cut and ground on standard gear cutting and grinding machines, using standard face mill cutters and annular grinding wheels. Design of these clutches and couplings is such that the opposite sides of spaced teeth can be cut in one operation, in two zones of cutting engagement. Greater load carrying capacity and better matching between mating tooth members are important advantages to be added to speed and ease of set-up.

The fixed coupling, which serves for a rigid connection of two parts, is one of the many types of Curvic clutches and couplings which can be advantageously produced by this member. An outstanding use of this type of coupling is for built-up crankshafts, such as are used on large aircraft engines. Our first design followed gear design and the teeth were generally radial. One side of the teeth was convex lengthwise, and the opposite side was concave. Both sides of a tooth space were simultaneously cut or ground on both members of the coupling. This was made possible by providing a tooth depth which increased rather rapidly from the inner to the outer end of the teeth.

The later design, Fig. 1, has been freed from gear analogies and is made for face clutches and couplings directly. It contains teeth of constant depth and is more flexible, particularly in relation to the pressure angle.

Fig. 8 shows a member of a Curvic coupling, which contains teeth of zero pressure angle and permits some relative displacement of the two members, especially in axial direction. The teeth of the coupling member shown form the rear part of a bevel gear.

This later design, which relates to Curvic fixed couplings, will be more specifically described by Figs. 2 to 7 in which Figs. 2 and 3 relate to one member and Figs. 4 and 5 relate to the mating member. Fig. 2 is a section taken along a mean plane perpendicular to the axis of the coupling. Fig. 3 is a corresponding front view and axial section, showing a cutter in engagement with the member. Fig. 4 is a cross-section similar to Fig. 2, taken on the mating member along a mean plane perpendicular to the axis. Fig. 5 is a corresponding front view and axial section.

Both members have generally radial teeth. On the member shown in Figs. 2 and 3 both sides of the teeth are concave lengthwise, so that the teeth have a trace of an hour glass shape. The lengthwise tooth curves have a radial tangent at a point half way between the tooth ends. They are circular arcs, and opposite sides of spaced teeth have a common center, so that they can be swept simultaneously by a face mill type cutter as shown, or also

by a grinding wheel representing the same shape. Here the cutter axis and the coupling axis are parallel.

The cutting process is very simple. Depthwise feed, usually along the cutter axis, is effected between the work and the rotating cutter until full depth is reached. The cutting surface in which the cutting edges lie then completely matches the two simultaneously cut sides and transmits its shape to the teeth. Withdrawal is effected so that the cutter clears the work, and the work is then indexed. This cycle is repeated until all the teeth have been cut on both sides.

In this cutting process the stock is removed in long chips which extend across the whole face width and the chips have full length right from the start. This, together with the absence of any lost feed, provides a highly efficient cutting operation.

The two sides of a tooth space are produced at different indexing positions of the work by opposite sweeps of the cutter. Opposite paths of the cutter points are shown in dotted lines at the tooth bottom shown at the top in Fig. 2. They are seen to overlap even at the large end of the tooth bottom. No fin is then formed there, and no added operation is required to provide a quality finish.

To provide strength the tooth bottom is well rounded at its junction with the sides. Interference between the rounded portions and the top edges of the mating teeth may be avoided by removing the top edges, without undue bottom clearance.

These edges may be removed by chamfering which is applied in the same operation as the cutting or grinding of the tooth sides, with a cutter or wheel formed to produce both the sides and the chamfer.

The mating member of the Curvic coupling contains teeth whose both sides are convex lengthwise, Fig. 4, and have somewhat of a barrel shape. Opposite sides of spaced teeth can be simultaneously cut with the inside cutting surface of a face mill type cutter.

Matching Tooth Sides

Full match over the entire tooth sides of the Curvic coupling is obtained when the finish-cutting surfaces of the two cutters completely match each other, as indicated in Fig. 5. In other words the outside cutting surface of the cutter shown in Fig. 2, indicated in dotted lines in Fig. 5 should then match and completely fit the inside cutting surface of the cutter shown in full lines. Their axes then coincide with each other when superimposed, and of necessity have the same distance from the axis of their work member.

Where ease-off of the tooth ends is desired, so that the inner and outer ends of the teeth do not touch fully at light load, it can be accomplished by using a cutter of smaller diameter for cutting the member of convex lengthwise profile, Fig. 4. Sometimes it is possible to use a cutter path as shown in dotted lines in Fig. 4. Here a smaller number of teeth are straddled by the spaced zones of cutting engagement, as compared with the cutter path shown in full lines. The ease-off thus obtained can be readily computed from the cutter diameters and the length of face. Should it be too large, and a definite ease-off is insisted upon, it may be provided by separate finishing operations for the two sides of the barrel-shaped teeth.

Ease-off at the tooth ends is especially important on non-rigid couplings and clutches, where it prevents load concentration at the tooth ends and thereby adds to the load carrying capacity.

Fig. 6 is a front view and axial section of a Curvic coupling of float-

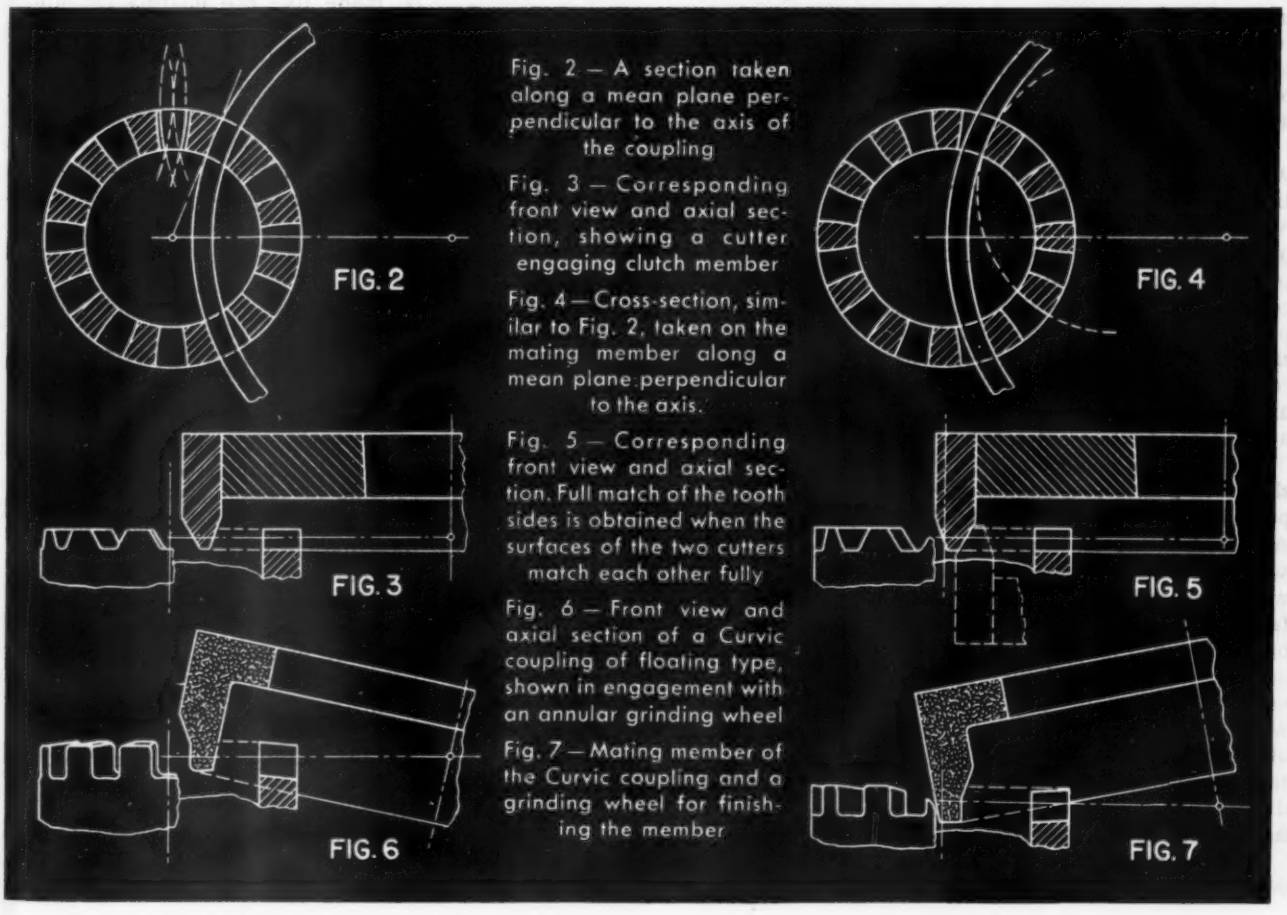


Fig. 2 — A section taken along a mean plane perpendicular to the axis of the coupling

Fig. 3 — Corresponding front view and axial section, showing a cutter engaging clutch member

Fig. 4 — Cross-section, similar to Fig. 2, taken on the mating member along a mean plane perpendicular to the axis.

Fig. 5 — Corresponding front view and axial section. Full match of the tooth sides is obtained when the surfaces of the two cutters match each other fully

Fig. 6 — Front view and axial section of a Curvic coupling of floating type, shown in engagement with an annular grinding wheel

Fig. 7 — Mating member of the Curvic coupling and a grinding wheel for finishing the member

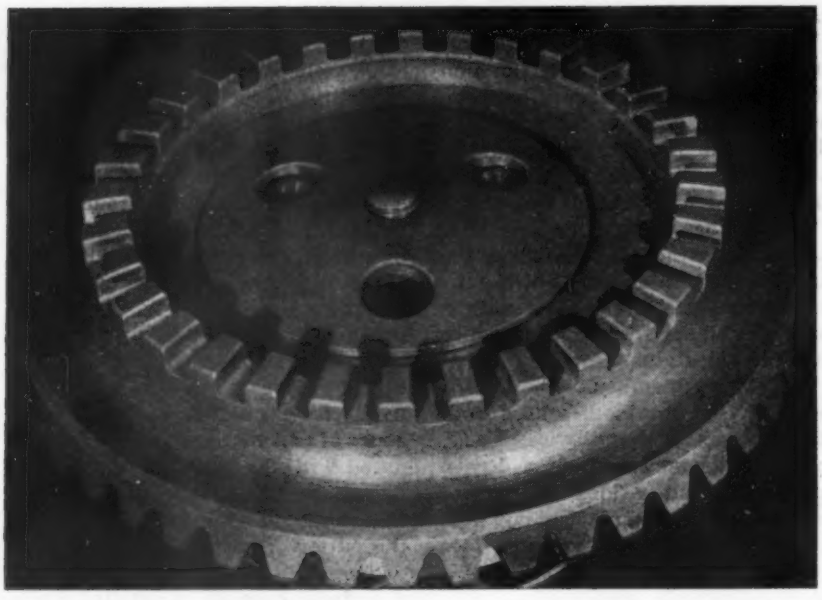


Fig. 8—A member of a Curvic coupling, containing teeth of zero pressure angle. The teeth of the member form the rear part of a bevel gear

ing type, shown in engagement with an annular grinding wheel. This coupling is of the type shown in Fig. 8. A cross section through the member shown, taken at right angles to its axis, is exactly like the section shown in Fig. 2.

The teeth have zero pressure angles where the tangent plane at a mean point of the tooth sides extends here in the direction of the axis of the coupling. Such teeth are ordinarily difficult to produce with anything but a scratchy finish.

Here, however, we have a method which produces a good finish in cutting as well as in grinding, and is highly efficient. In spite of the zero pressure angle of the teeth the tool pressure angle does not have to be zero. A grinding wheel of positive pressure angle may be used, as shown, by tilting the work axis with respect to the wheel axis. The two axes are disposed in the same plane, and intersect when extended.

The working surface of the wheel shown in Fig. 6 is a conical surface provided on the outside of the wheel. Adjacent to it is another conical surface of increased pressure angle, which serves for grinding the chamfer at the tooth tops in the same operation in which the tooth sides are ground. These grinding surfaces can be restored by dressing when worn, after advancing the wheel along its axis. The new grinding surfaces thus obtained are identical in diameter as well as profile with the first grinding surfaces.

The mating member of the Curvic coupling, and a grinding wheel for finishing it, are shown in Fig. 7. Fig. 5 can also be considered a cross-section of this member. This wheel grinds with its inside surface of positive pressure angle, which can also be restored by dressing.

The teeth of a Curvic coupling or clutch member can be ground after cutting, or from the solid. In both cases several rapid grinding passes are made. The wheel is rapidly advanced along its axis to within reach of the tooth sides, and then slowly to its final feed position. It is then withdrawn and the work is indexed. The final feed position is advanced the next time around, until at the last pass it coincides with the full depth position, where the final shape is transferred to the teeth. This applies equally to couplings and clutches of zero and of positive pressure angle.

Cutting is performed with a face mill type cutter whose cutting surface coincides with the working surface of the grinding wheel shown, by effecting a depthwise feed motion along the cutter axis. Positive blade pressure angles are also appreciated in cutting, for they permit axial relief of the cutter. Thus the cutter keeps both its cutting profile after sharpening and its exact diameter.

When the cutter or wheel pressure angle differs from the pressure angle to be produced on the teeth, and the tool axis and work axis are tilted with respect to one another, as in Figs. 6 and 7, then the direction of the teeth is somewhat inclined to the plane of the work. Thus the teeth of the member shown in Fig. 6 are arranged on a slightly positive or external taper, and the teeth of the member shown in Fig. 7 are arranged on a negative or internal taper of equal amount. Here the tooth sides of the two members can also be made to match each other completely and exactly.

Shift clutches, for repeated engagement and disengagement, can be made like the floating coupling shown, except that the tooth chamfer which facilitates engagement occupies a larger portion of the teeth. Chamfer and tooth sides are cut in the same operation.

The second installment of Mr. Wildhaber's article will follow in an early number.

Americans Observe Nazi Production Might

AMERICAN ENGINEERS visiting those sections of Germany which supplied the Nazi war machine with weapons have seen machine tools in excessive quantities. Many of the machines were of the semi-automatic type and this is explained by the fact that the Nazis used slave labor. The machines all seemed to be finished to prewar standards instead of "war finish." Tungsten-carbide tools were much in evidence and in some instances carbide tips were found on small drills. Long, curling chips running all over the shops evidenced the absence of chip breakers on turning tools.

The visiting engineers were also impressed with the measuring instruments used in Nazi war production. Dial and other types were found in abundance. Micrometers capable of being used as "go" and "not go" gages were among the interesting tools discovered. Large vernier calipers with a micrometer head in the movable jaw evinced interest. A variety of hole measuring devices attracted considerable attention and will undoubtedly draw the interest of instrument makers in this country. The ingenuity of these devices and the quality of workmanship that they engender make it evident that strict supervision of all German manufacturing operations will be essential in the years to come to remove the threat of another war.

STEADY JOBS *and* EQUIPMENT BUYING

SUSTAINED employment is not an attainable goal unless we can moderate the erratic fluctuations which have characterized the markets for producers' equipment in past periods.

In the 35th editorial of this series, "Sustained Construction Activity", it was pointed out that there is no specific that can cure our economy of its "boom-or-bust" proclivities. Rejecting the notion that the construction industry could be so managed as to stabilize business as a whole, that editorial stressed the important contribution it could make to that end, and suggested several practical expedients through which construction activity might be regularized.

Producers' equipment represents an area of production quite as broad and diverse as construction, though smaller in aggregate value. The classification embraces all types of durable equipment bought and used for profit—locomotives, motor trucks, electric generators, conveyors, machine tools, farm implements, and so on down to surgical instruments and dentists' drills.

Although the output of such equipment averages over a long period only 5 or 6 per cent of the nation's total output, it resembles construction in its extraordinary ups and downs. While its component items differ widely in the amplitude and violence of their fluctuations, the class as a whole is one of the most unstable sectors of the economy, making therefore a quite disproportionate contribution to the cyclical swings of total production and employment. From 1929 to 1932, for example, the decline in the output of producers' equipment (at constant prices) was 65-70 per cent, in contrast to a decline of 25-30 per cent in the national output exclusive of such equipment and construction.

A more recent example of the volatility of demand in this field may be found in the movement of a monthly index of orders for industrial equipment, which rose from 92 in the spring of 1936 to 160 in the spring of 1937, falling thence to 65 in the summer of 1938 and rising again to 142 in the fall of 1939. Such fantastic oscillations present an obvious and inescapable challenge to all concerned with economic stabilization.

Not only are these fluctuations bad for the economy; they represent demonstrably bad buying policy on the part of the purchasers of equipment. Peaks in demand come characteristically just before a business depression (1919, 1929, and 1937, for example) when machinery costs the most to buy and install and when it has the lowest expectancy of continuous use. At exactly the wrong moment everyone wants to buy. In the depression itself, on the other hand, with costs down, and with nowhere for the economy to go but up, equipment is a drug on the market. No one wants it when it is cheap and has the greatest prospect for steady employment. Here is a behavior pattern so profoundly irrational there must be hope for its correction.

There is an inveterate tendency for business management to forecast the future simply by projecting the trends of immediate past. Although it is axiomatic that the chance for an extended period of further prosperity is inversely related to the duration of the prosperity already experienced, this truism is generally ignored. The longer the boom has run, the more certain is business management that it will continue indefinitely. Convinced at last by "actual experience" that prosperity is here to stay, executives give the green light to commitments for expansion and modernization previously deferred in a skeptical attitude of "wait and see". The result, so often repeated in our economic history, is an explosive burst of demand for equipment coincident with, and contributing to, the final spasm of a boom. Witness the phenomenal rise in industrial equipment orders during 1928 and the spring of 1929.

The same prophetic illusion works in reverse during a depression. Recent experience is projected into the future. Although the mathematical probability of an imminent and prolonged period of prosperity increases directly with the duration of a depression, it finds little reflection in business decisions. Timidity and caution are the order of the day.

Compounding the errors caused by faulty perspective, are a number of influences which make it extremely difficult for individual enterprises to follow a policy geared to sensible long-term considerations. In a boom, particularly in its climactic phase, most producers find their order books crowded beyond the potential of their current capacities and are faced with the alternatives of expanding or losing trade to competitors. In depression the situation is reversed, and producers with unused facilities find it difficult to justify increases in their capital charges.

An even more controlling factor in many cases is the availability of funds. This is especially important

for small concerns. Typically such firms enjoy but limited credit, and with no ready access to the securities markets, their capital expenditures depend primarily on earnings. When they are making money, they can afford to buy equipment; when they are losing, they largely disappear from the equipment market. Even great enterprises, though less dependent on earnings as a source of capital financing, are profoundly influenced by the volume of internal funds available for the purpose, a volume as a rule far greater in prosperity than in depression. Moreover, it is usually easier in good times to obtain outside funds through the sale of stock or by borrowing, since in bad times bankers, underwriters, and investors are susceptible to the same timidity and caution that afflict business management generally.

We are dealing here with a combination of psychological, physical, and financial forces which conspire to aggravate the instability of demand for capital equipment. What can be done to reduce this instability and thus to bring equipment purchasing into a more sensible and constructive pattern?

There is no panacea, no royal road to the solution. The problem has been with us since the beginning of the industrial economy. It is complex and difficult. It is not, however, wholly intractable. We may reasonably hope that industry will, through intelligent effort, make substantial progress toward a satisfactory solution. The industrial equipment field is one in which government, except for war periods, has exerted little direct control. The best insurance against the institution of government measures is to so conduct activities in the equipment field that no justification for government interposition can be made.

☆ ☆ ☆

1. The first and most important step is for industry itself to reconsider its heretofore haphazard and opportunistic policy in the purchase of equipment, substituting so far as possible a regularized, long-range programming of expenditure that will resist both the excited long-buying of booms and the equally disturbing underbuying of depressions. Such long-range programming is particularly appropriate and advantageous for large enterprises in established industries such as railroads, electric power, steel, automobiles, and the like, but it makes sense much more generally.

Once executives come to realize that a reasonably stable equipment program contributes not only to the welfare of the economy but also to the lowering of their long-run equipment costs, the opportunity to combine a public service with private advantage should induce them to recast their policies accordingly.

There is an even more compelling reason for purchasers of industrial equipment to do everything possible to regularize their demands. Some concerns unquestionably will find themselves in a postwar position where speedy delivery of needed equipment, even though it involves the payment of premium prices, will seem to be justified. But there is no system of accounting that can show it to be a profitable transaction to promote an equipment industry boom that runs a brief course only to collapse when the backlog of deferred maintenance and development has been satisfied. That, historically, has been the trigger which trips the door to the depression phase of the business cycle. No immediate advantage can compensate for the contagious paralysis that infects all business enterprise when major layoffs occur in any major segment. No precautionary measures, self-imposed by business, can be regarded as unduly severe if they can prevent this devastating blight.

2. Financial agencies can and should play a responsible role in regularizing equipment demand. Funds for the purchase of producers' equipment should be offered boldly and at low interest during depression periods, and should progressively tighten as a boom market bids up the price of purchase and installation. Banks and financial houses have excellent facilities for gathering and interpreting market and general economic information. It is good business for them, and for the national economy, to exercise their accepted discretions in a manner that will help to promote economic stability.

3. There now is almost universal recognition of the need for a thorough-going revision of our corporate tax structure to the end that effective incentives may be offered for private capital investment. The possibility of including provisions which would offer special tax concessions to equipment investments made in depression periods is worthy of intensive exploration.

☆ ☆ ☆

The fundamental problem here is educational. If all business enterprises in a position to do so were to regularize their equipment expenditures, it would have a tremendously beneficial effect. True, it would accomplish no miracles. For many concerns it is not feasible to schedule equipment buying over a long period. Even those who do schedule it are likely in practice to attain only a relative stability. It must be acknowledged, moreover, that few programs could withstand indefinitely a very deep and prolonged depression such as we had in the thirties. Nevertheless the adoption of stabilization policies where feasible would make a signal contribution both to the restraint of booms and to the mitigation of depressions. Here is something industry can do for itself.

It is easy to disparage such remedies for economic instability as are here proposed on the ground that they are partial only. However, joined with others also partial, they can achieve in combination a solid progress toward the goal of sustained high level employment—progress that is unattainable through economic cure-alls. The road suggested is a slow road, and difficult, but it leads upward.

President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 37TH OF A SERIES

Chemical Treatment of Aluminum Improves Paint Adherence

BY C. B. GLEASON, THOMSON LABORATORY, GENERAL ELECTRIC COMPANY

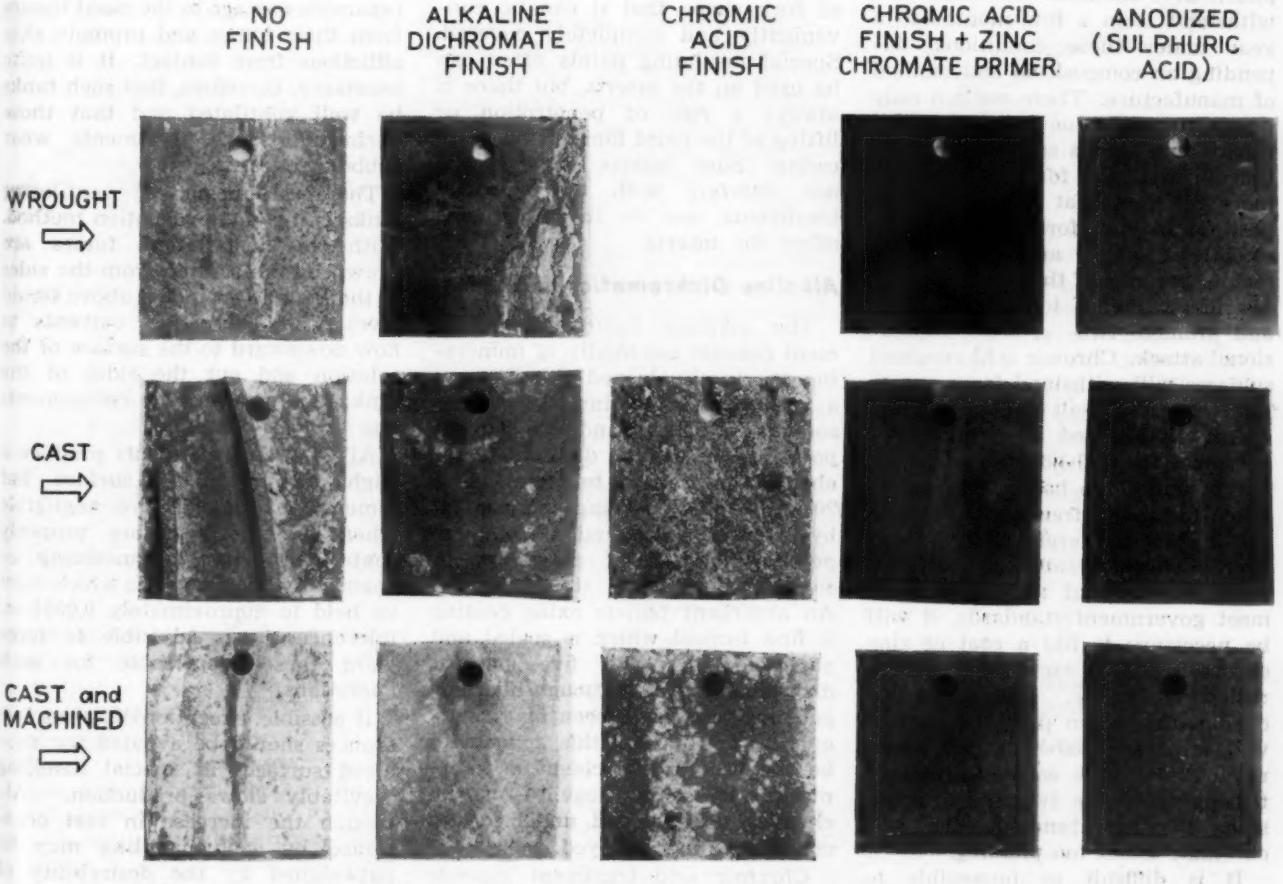
Providing a bond for painted finishes is the one principal function of chemical treatment of aluminum. The corrosion resistance increase is considered a minor secondary effect

CHEMICAL TREATMENTS for aluminum and its alloys comprise simple immersions in aqueous solutions of inorganic chemical compounds. No electric current is used. Their primary function is to improve paint adherence, although they do increase resistance against ordinary atmospheric corrosion.

There are three types or classifications of chemical treatments in general use: alkaline dichromate, chromic acid and phosphate. They are markedly inferior to anodizing as far as corrosion and abrasion resistance are concerned and should be considered as a substitute only under one of these conditions:

1. When anodizing equipment is not available.
2. When maximum corrosion resistance is not required.
3. For parts contained steel or bronze inserts.
4. When the aluminum part must ultimately be painted as part of an assembly, or to match other painted parts.

The thickness of the coatings formed by chemical finishes are always less than 0.00001 in. as compared with typical thicknesses of 0.00006 in. for chromic acid anodizing and 0.0004 in. for sulphuric acid anodizing. The chemically prepared surfaces, being both thinner and softer than anodized surfaces, have much less resistance to abrasion and



Effective protection of aluminum alloys against corrosion by the 250-hr. salt spray test varies with the type of material and finish. Wrought materials withstand corrosion to a greater degree than cast metal and electrolytic finishes are more effective than those produced chemically

FUNDAMENTAL FACTS ABOUT THE CHEMICAL TREATMENT OF ALUMINUM

A. The primary function of chemical treatments is to prepare the surface to improve paint adherence.

B. Chemical finishes promote an appreciable increase in corrosion resistance against inland atmospheres but have little benefit against salt spray.

C. Where anodizing is called for in specifications, chemical finishes can be substituted only with the provision that subsequent primers and paints be applied.

D. When the acme of protection against salt water or salt spray corrosion is desired, tests have proved that the best system is first to anodize, second to apply a coat of zinc chromate primer, and finally to apply at least two coats of aluminum pigmented varnish of the Bakelite type or equivalent.

consequently require more care in handling to prevent marring or scratching of the finish.

Corrosion Resistance

Government standards require anodized aluminum to withstand 250 hours in a salt spray (20 percent sodium chloride in water). Sulphuric acid anodized aluminum will withstand from a few months to a year under these conditions, depending on composition and method of manufacture. There are not only wide differences due to the chemical constituents, but a specific composition in wrought form is basically more resistant that the same composition in cast form, because the smoother surface and comparative lack of porosity of the wrought form has less tendency to hold moisture and promote two- or three-dimensional attack. Chromic acid anodized surfaces will withstand from one to four months salt spray, while chemically treated aluminum will not meet the 250-hour requirement except under the best conditions of alloy, form, and treatment.

It is obvious, therefore, that whenever chemical treatments are proposed in place of anodizing or to meet government standards, it will be necessary to use a coat of zinc chromate primer for additional corrosion resistance. Although this combination when properly applied will meet the 250-hour salt spray requirement, it is usually necessary to apply one or two finish coats, since the appearance of the zinc chromate is not too pleasing.

It is difficult or impossible to anodize aluminum parts containing inserts of other metals, such as steel or bronze inserts, whether or not the inserts be plated. This is because the anodizing current concentrates on the point of least resistance, and the inserts are vigorously attacked, being pitted or chewed away while the aluminum is robbed at the same time of the current necessary to form the oxide coating. Rubber gaskets can sometimes be used when the insert is of such shape that it can be conveniently and completely covered. Special insulating paints often can be used on the inserts, but there is always a risk of penetration or lifting of the paint film during processing. Such inserts, however, do not interfere with the chemical treatments, nor do the treatments affect the inserts.

Alkaline Dichromatic Finishes

The alkaline dichromate treatment consists essentially of immersing previously cleaned aluminum in a solution containing 3 percent sodium carbonate and 0.1 percent potassium or sodium dichromate for about 20 min. at a temperature of 208-212 F. and sealing the coating by a 10 min. immersion in a five percent solution of potassium or sodium dichromate at 180-190 F. An absorbent porous oxide coating is first formed which is sealed and passivated by the five percent dichromate bath. Although all comparative tests have been of a semi-quantitative nature, this appears to be the best of the chemical treatments. It is the heaviest of the chemical coatings and, under certain conditions, may be dyed.

Chromic acid treatment consists essentially of a 5 to 10 min. immersion of the previously cleaned aluminum in five percent chromic acid at a temperature of 120-140 F. The improved corrosion resistance is due to increased passivity of the surface. This method requires more attention in precleaning than any of the other chemical methods, since the chromic acid will not break through the thinnest of greasy films, such as finger marks, whereas the other treatments described will so do.

A phosphate solution can be used containing 40 percent butyl alcohol, 30 percent isopropyl alcohol, 10 percent phosphoric acid, and 20 percent water by volume. These retard ordinary atmospheric corrosion because of the resultant insoluble phosphate film. The phosphate finish was used without supplementary finishes for a considerable period of time on outdoor meter cases with quite satisfactory results. It produces a much more pleasing appearance than either the alkaline dichromate or chromic acid treatment.

No special equipment is necessary for any of these chemical treatments, since the solution can be held in ordinary low-carbon steel tanks.

The fact should not be overlooked, however, that solutions containing chromates in any form can cause irreparable damage to the nasal tissues from their fumes and promote skin afflictions from contact. It is quite necessary, therefore, that such tanks be well ventilated and that those performing such treatments wear rubber gloves.

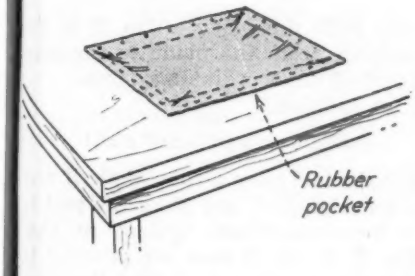
The best means of ventilating tanks is the side evacuation method. With this installation, fumes are drawn by fan suction from the sides of the tank a few inches above liquid level. This causes air currents to flow downward to the surface of the solution and out the sides of the tank, thus preventing escapements due to cross-currents.

All of these treatments produce a slight etching of the surface, but dimensional changes are negligible when the processes are properly controlled. Whether anodizing or chemically treating parts which must be held to approximately 0.0001-in. tolerances, it is advisible to forewarn those responsible for such operations.

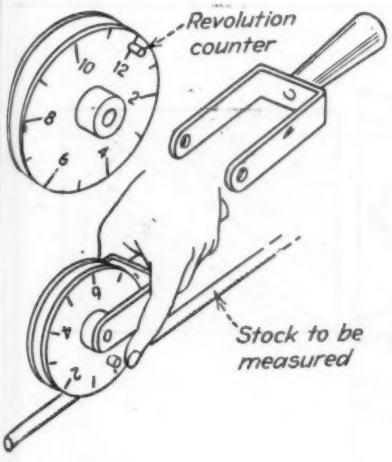
If possible, exceptionally close tolerances should be avoided for anodized surfaces as special handling inevitably slows production. Although the increase in cost occasioned by such handling may be outweighed by the desirability of maintaining close tolerances, a possible increase in rejections must be taken into account.

Short Cuts FOR THE SMALL SHOP

BY A. H. WAYCHOFF

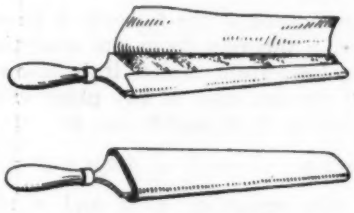


A RUBBER POCKET in the work bench makes a handy place to drop small parts. Even the smallest parts can be dropped on the pocket safely; they can be washed there with gasoline, solvent or lye water. When the rubber wears out it can be renewed at no expense. Merely pull out the tacks and fit a piece of old inner tube in place. The square or oblong hole for the rubber pocket can be cut at any point in the bench surface. Anyone will find dozens of uses for a small pocket of this kind.



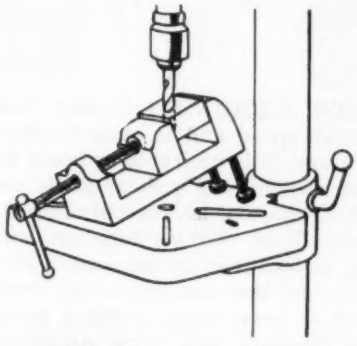
MEASURING WHEELS for pipe, tubing, angle iron are better and faster than a tape or yardstick. Take a grooved pulley with a 12 in. circumference (this is an easy size to get) and mark a scale on one side in inches. Drill a small hole at the 12 in. graduation and insert a small pin. Complete the measuring wheel by fitting it with a strap-iron yoke and handle. In use, simply hold the wheel with one hand and walk the length of the pipe or tube, keeping count of each time the pin strikes the forefinger. With a little experience, the user can measure long pieces within an accuracy of an inch, which is close enough for stockroom operations.

FILE SCABBARDS are easily made of paper and preserve the tools against bumps and corrosion when not in use. To make the scabbard, wrap one turn of manila paper around the file. Then a strip of paper

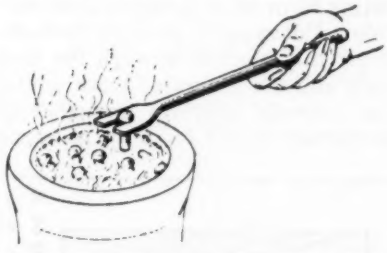


is coated on one side with glue or cement and wrapped (coated side out) over the first sheet for ten or twelve turns. After drying overnight, the scabbard is best dipped or painted with melted paraffine. When the inside wrapper is pulled out, the scabbard then fits the tool snugly.

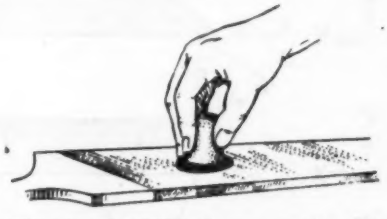
ANTI-SLIP FEET for ladders can be made from the leaves of old automobile springs. Get a couple of the shortest leaves and attach one to each foot of the ladder with a lagscrew. Do not draw the lagscrew tight—the spring leaf should be free to adapt itself to the ground. The ladder will never slide along a wall if the same idea is also applied to the top. In this case, fasten the spring leaves to the side members.



DRILL VISES are often raised at one end with a piece of wood so as to drill a hole at an angle. A better idea is to drill and tap either ¼ or 5/16 in. holes in the outer, stationary jaw. When necessary to drill a hole at an angle, merely screw two capscrews into the tapped holes, and raise the vise to the angle desired.



HOT RIVETS are more easily handled with a fork or slotted paddle than with the conventional tongs. To make a suitable fork, merely forge a paddle and then cut a slot in the flat end. Make the slot large enough so that the rivet shank will enter freely but the head will not fall through. Hot rivets are more easily picked up and thrown with this fork than with tongs.



METAL WASHERS are easily filed flat to the desired thickness by laying them on a file and using a rubber stopper as a work "pusher." By pressing the stopper firmly onto the washer, the rubber deforms, enters the washer hole and takes a nonslip grip. It is an easy matter to reduce a washer to paper thinness.

Form-Tool Correction Made Easy By a Simple Formula

BY ALFRED S. GUTMAN

WHEN MACHINING formed work at high speed and to close limits of accuracy, it is desirable to use a flat form tool having a shear angle and to feed the tool tangentially into the work. With this combination, cutting is localized in contrast with a form tool that acts upon the entire form at once, thus avoiding heavy tool pressure and work distortion. But the use of a shear angle in combination with the customary rake and relief angles complicates the correction of the form tool—a step which is necessary because, as is well known, the desired form cannot be produced by a tool of identical shape.

There are several methods of correcting form tools; however it is possible to develop a general formula giving the relation between the tool angle and the generated work angle. This formula provides immediately the correct angles for form grinding the tool, and it is then a simple matter to calculate tool dimensions.

The problem that lead up to derivation of the formula was this: specifications for a fuel-control valve called for a 45 deg. chamfer, plus or minus two minutes. Assume a tool with a rake angle $R = 20$ deg. a shear angle $S = 30$ deg., a relief angle $C = 2$ deg. 30 min., and the angle between tool and work axes is 90 deg. What is the correct angle normal to the tool?

Derivation of the formula is based upon a theorem from the analytics of solids, from which it is known that the equation of any plane with respect to X, Y, and Z axes is:

$$X \cos a + Y \cos b + Z \cos c - P = 0$$

In this equation, a, b and c are the angles between the normal and X, Y and Z axes, and the normal passes through the zero point of the coordinate system and is perpendicular with the plane. Also, P is the distance from the plane to the zero point of the coordinate system.

In addition,

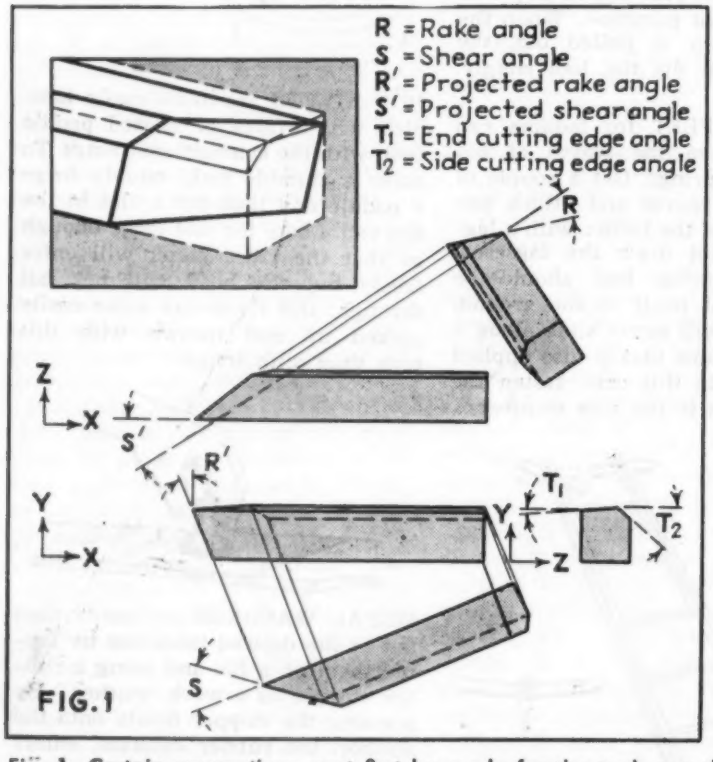
$$\cos^2 a + \cos^2 b + \cos^2 c = 1$$

Let the tool have a rake angle R and a shear angle S and place the tool in a three-coordinate system so that the X, Y and Z axes are parallel to the tool edges and so that the zero point of the system lies within the tool face. Under these conditions the angle between the X axis and a normal to the face is $90\text{-}S$, the angle with respect to the Y axis is $90\text{-}R$ and the angle with respect to the Z axis is B. Then $\cos(90\text{-}R) = \sin R$, and $\cos(90\text{-}S) = \sin S$. Under these conditions the equation of the plane containing the face of the tool can be written:

$$X \sin S + Y \sin R + Z \cos B = 0$$

or

$$\sin^2 S + \sin^2 R + \cos^2 B = 1$$



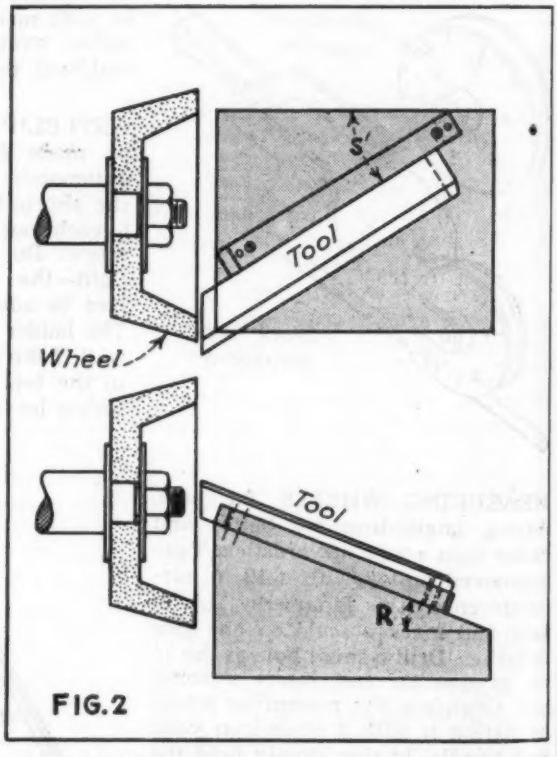


Fig. 1—Certain assumptions must first be made for the tool, namely, the rake, shear and relief angles. Then the tool angles T_1 and T_2 can be calculated. Fig. 2—Rake angle R and projected shear angle S' are used when making the the fixture, which is used to grind the tool face at a compound angle with respect to the axis

Then $\cos B = \sqrt{1 - (\sin^2 S + \sin^2 R)}$

Let $S = 30$ deg. and $R = 20$ deg.

Then B is found as follows:

$\sin 30$ deg. $= 0.500$

$\sin^2 30$ deg. $= 0.250000$

$\log \sin 20$ deg. $= 9.5340517$

$\log \sin^2 20$ deg. $= 9.0681034$

$\sin^2 20$ deg. $= 0.116978$

Then:

$\cos^2 B = 1 - (0.250000 + 0.116978)$

$= 0.633022$

$\log \cos^2 B = 9.8014188$

$\log \cos B = 9.9007094$

$B = 37$ deg. 17 min. 8 sec.

Angles R and S are the ones measured by the toolmaker, but projected angles R' and S' are needed for the grinding fixture.

When:

$X = 0, \cot R' = \dfrac{\cos B}{\sin R}$

$Y = 0, \cot S' = \dfrac{\cos B}{\sin S}$

$\log \cos B = 9.9007094$

$\log \sin R = 9.5340519$

$\log \cot R' = \overline{0.3666577}$

$R' = 23$ deg. 15 min. 42 sec.

$\log \cos B = 9.9007094$

$\log \sin S = 9.6989700$

$\log \cot S' = \overline{0.2017394}$

$S' = 32$ deg. 8 min. 48 sec.

The general shape, grinding and setting of the form tool have been described. It is now necessary to establish the relationship between the angle T ground on the tool and the angle W to be produced on the work.

Consider the tool illustrated, and set normal to the work axis at clearance angle C and fed tangentially to the work. Two coordinate systems are introduced: the X, Y, Z coordinates are parallel to the tool edges; the X', Y' Z' coordinates are parallel to and normal to the work axis.

To turn a coordinate system:

$X' = X \cos a_1 + Y \cos b_1 + Z \cos c_1$

$Y' = X \cos a_2 + Y \cos b_2 + Z \cos c_2$

$Z' = X \cos a_3 + Y \cos b_3 + Z \cos c_3$

Where the X' axis is at:

angle a_1 with the X axis

angle b_1 with the Y axis

angle c_1 with the Z axis

Where the Y' axis is at:

angle a_2 with the X axis

angle b_2 with the Y axis

angle c_2 with the Z axis

Where the Z' axis is at:

angle a_3 with the X axis

angle b_3 with the Y axis

angle c_3 with the Z axis

In the example cited:

$a_1 = 0$

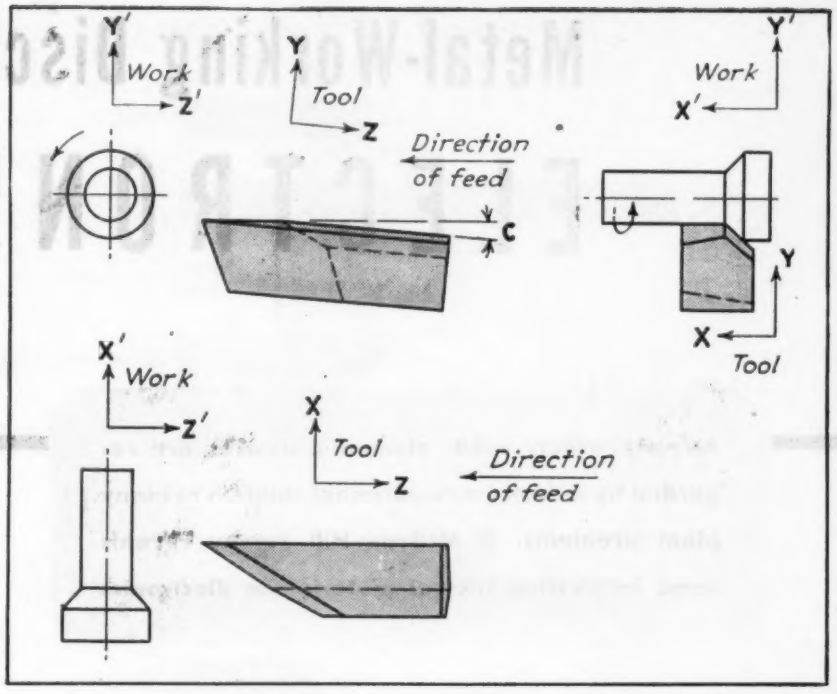


Fig. 3—The tool is set at relief angle C and is fed tangentially to the work

$a_2 = 90$ deg.

$a_3 = 90$ deg.

$b_1 = 90$ deg.

$b_2 = C$

$b_3 = 90$ deg. $+ C$

$c_1 = 90$ deg.

$c_2 = 90$ deg. $+ C$

$c_3 = C$

Then the coordinate transformation (with $\cos (90 + C) = \sin C$) is:

$X' = X$

$Y' = Y \cos C + Z \sin C$

$Z' = Y \sin C + Z \cos C$

$Z = \dfrac{\sin S}{\cos B} \cdot X + \dfrac{\sin R}{\cos B} \cdot Y$

For the work angle W:

$\tan W = \dfrac{Y'}{X'}$

For the tool angle T:

$\tan T = \dfrac{Y}{X}$

$Y = X \tan T$

Then, $\tan W$

$= \dfrac{1}{X}\left[X \tan T \cos C + \dfrac{X \sin S \cdot \sin C}{\cos B} \cdot \dfrac{X \tan T \sin C \cdot \sin R}{\cos B}\right]$

$= \tan T\left[\cos C + \dfrac{\sin C \cdot \sin R}{\cos B}\right] + \dfrac{\sin C \cdot \sin S}{\cos B}$

$\tan T = \dfrac{\tan W - \dfrac{\sin C \cdot \sin S}{\cos B}}{\cos C + \dfrac{\sin C \cdot \sin R}{\cos B}}$

$= \dfrac{\tan W \cos B - \sin C \cdot \sin S}{\cos B \cdot \cos C + \sin C \cdot \sin R}$

What angles T_1 and T_2 must be ground originally on the tool stock in order to correct the form?

It is known that for the tool in question, these values apply:

$R = 20$ deg.

$S = 30$ deg.

$C = 2$ deg. 30 min.

$B = 37$ deg. 17 min. 8 sec.

With these values and logarithms, the above equation for $\tan T$ is simplified thus:

$\tan T = 0.982512 \tan W - 0.0269326$

Values of T for various work angles W are:

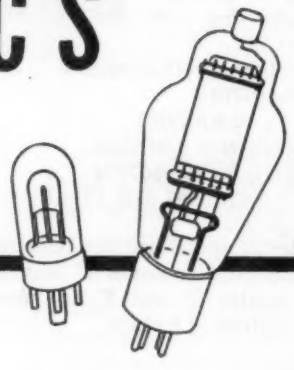
W	T
0	1 deg. 32 min. 34 sec.
30	28 deg. 23 min. 0 sec.
45	43 deg. 41 min. 56 sec.

Therefore, in the example, $T_1 = 1$ deg. 32 min. 34 sec., and $T_2 = 43$ deg. 41 min. 56 sec.

In the foregoing, the discussion has been limited to positive acute angles from zero to 45 deg. If B is greater than 45 deg., the complementary angle $(90 - B)$ is chosen. In this case, $\sin (90 \pm B) = \cos B$ and $\cos (90 \pm B) = \pm \sin B$.

The simplicity of this method for calculating correction of forming tools should appeal to those who must produce work to close tolerances and wish to avoid both cut and try methods or point by point calculation.

Metal-Working Discovers ELECTRONICS



Already widely used, electronic devices are regarded by industry as a potential solution to many plant problems. A McGraw-Hill survey reveals some interesting factual material on electronics

ELECTRONIC APPLICATIONS have established a solid place in the metal-working industry. Much of the mystery associated with electronics has been dissipated, and in its stead has come an enthusiasm for expanded development of this industrial instrument.

This is supported by information gained direct from the field of industry in an exhaustive survey on the subject of electronics conducted by the McGraw-Hill Research Department. Recognized authorities in the field of electronics cooperated in preparing the questions which drew factual data on present uses and logical suggestions for potential applications.

Inspired by the ever-increasing interest in industrial electronics, the survey substantiates the fact that plant engineers and operators recognize the value of electronics and are looking forward to the development of expanded applications for industry.

One phase of the survey was devoted exclusively to the metal-working industry. The 268 companies responding revealed they now use 8,490 electronic devices, and suggested an array of potential applications which might serve to overcome some of their production problems.

The entire survey consisted of two major questions. The first determined the number, type and applications of electronic devices in use; the second reported no more than three of the problems facing the particular plant—problems which have not been solved to their satisfaction and which might be eased by electronic functions. In this latter connection, it might be pointed out that no attempt was made to judge the practicability of solving industry's problems by electronic devices.

Eight major types of applications formed the basis of the inquiry in the metal-working industry. They are: heating; control; regulation; power conversion; counting, sorting weighing and inspecting; molecular vibration; measurement and analysis; and safety.

Induction Heating Leads

The largest present use of electronic heating is in the induction heating of ferrous and non-ferrous metals. Use of induction heating for ferrous metals includes hardening, annealing and heat-treating, brazing, flowing of tin on tinplate, baking of finishes; preheating for welding, forging, spinning, extruding or upsetting, stress relief of welds, and melting. Application to non-ferrous metals include brazing and soldering, annealing, melting, alloying, heat-treating, degassing of tube electrodes, glass-to-metal seals and welding. Dielectric applications range from the processing of impregnated sheet materials and sheet plastics to wood.

A variety of electronic innovations in the heating field are foreseen by plant executives and production men. For example, it was suggested that an electronic heat-treating unit be devised for hardening small lots of material of different shapes. It was pointed out that present units fit into mass production, but do not lend themselves to the heat-treating of random items.

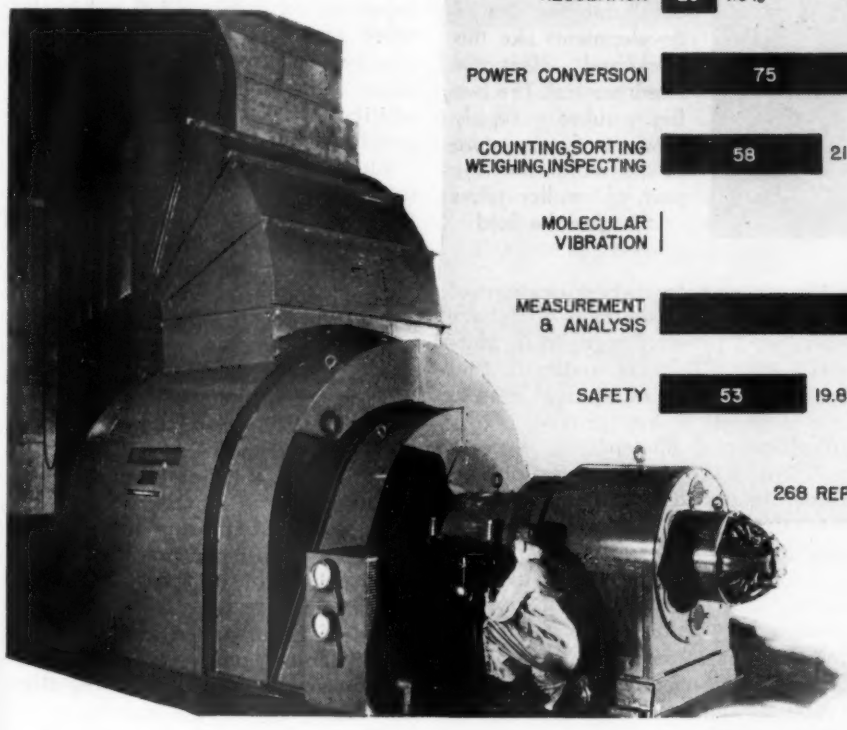
A potential use in the field of powder metallurgy was envisioned in the application of electronic power to the simultaneous heating and compressing of metal powders to form solid, accurately shaped metal parts. Induction hardening of high-speed steel bits for inserted blade milling cutters, and welding by induction heating are among other proposals submitted.

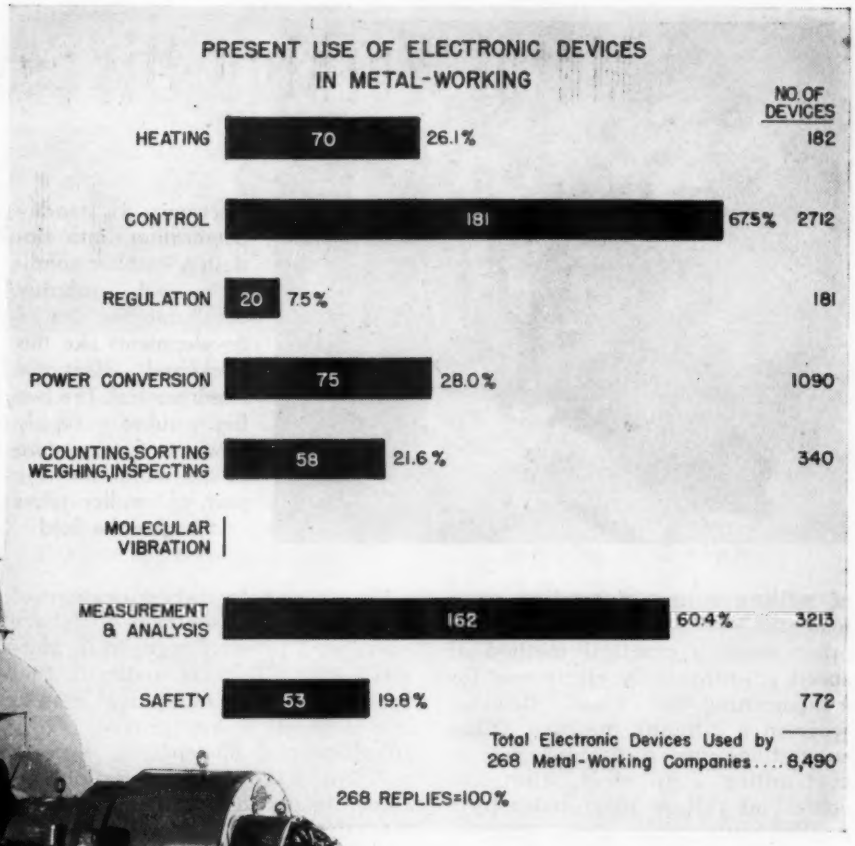
Electronic controls are most widely used to control motor speeds, temperatures, timing and welding. However, nearly every type of control has been found useful to some extent in metal working. Particular emphasis on the recognition of electronic control in the machine tool field is evident in the survey returns.

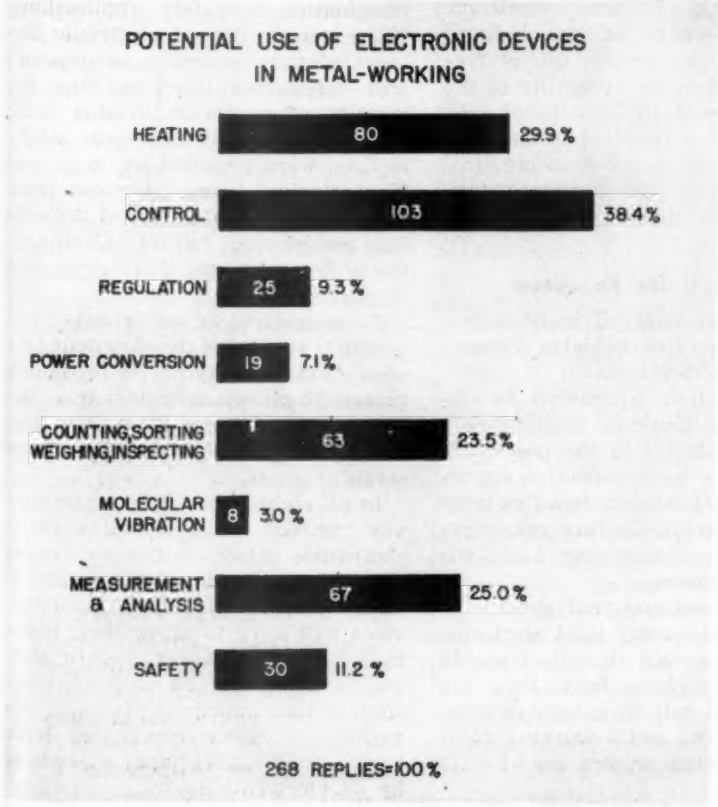
One company revealed it is making its own experiments with an electronic device for assisting in the undercutting of commutators on small motors. The spokesman pointed out that it is impossible to use an indexing arrangement to turn the commutator from mica to mica because of slight variations in the thickness of the mica and copper, which makes bar-spacing non-uniform. The company is working on an attachment using the "electric eye" to position the mica by contrast of color between the mica and copper.

Another firm engaged in the manufacture of aircraft and automotive parts suggests the possibility of electronic control for cooling agents used on milling machines and other machine tools. The device would serve to control exactly the amount of liquid used by the temperature of liquid serving as cooling agent.

Electronic tubes are the heart of the air-cleaning equipment used for ventilating this synchronous condenser. The unit, a typical example of electronics in industry, employs 56 precipitron cells. The electrostatic air cleaner removes between 85 and 90 percent of the dust and dirt from the incoming ventilating air




PRESENT USE OF ELECTRONIC DEVICES IN METAL-WORKING
NO. OF DEVICES
HEATING 70 26.1% 182
CONTROL 181 67.5% 2712
REGULATION 20 7.5% 181
POWER CONVERSION 75 28.0% 1090
COUNTING, SORTING WEIGHING, INSPECTING 58 21.6% 340
MOLECULAR VIBRATION
MEASUREMENT & ANALYSIS 162 60.4% 3213
SAFETY 53 19.8% 772
Total Electronic Devices Used by 268 Metal-Working Companies.... 8,490
268 REPLIES=100%


POTENTIAL USE OF ELECTRONIC DEVICES IN METAL-WORKING
HEATING 80 29.9%
CONTROL 103 38.4%
REGULATION 25 9.3%
POWER CONVERSION 19 7.1%
COUNTING, SORTING WEIGHING, INSPECTING 63 23.5%
MOLECULAR VIBRATION 8 3.0%
MEASUREMENT & ANALYSIS 67 25.0%
SAFETY 30 11.2%
268 REPLIES=100%

Better methods of heat-treating control to hold Rockwell tolerances closer is another company-expressed need. A manufacturer of electric motors and generators voiced interest in electronic motor speed control, pointing out that his company has found considerable interest in such an application on the part of machine tool builders.

Another potential use was stated as follows: "An electronic eye device to check the operation of a completed engine for proper timing of valve openings and closings and spark occurrence, combined with a device for keeping a record of the operations."

Voltage, current and phase regulation lead the list of present uses in this class. The regulation of generator voltage accounts for almost as many devices as all other voltage, current and phase devices combined. Potentially, however, the greatest interest seems to be in speed and process regulation.

One manufacturer said that roll-grinding machines could be improved greatly by supplying electronic control on the grinding wheel. He added that the driving motor should maintain constant peripheral speed on the grinding surface of the wheel under varying feed of work and decreasing wheel diameter due to wear.

In the matter of speed adjustment, one firm advocates automatic regulation of the speed

Electronics is steadily penetrating into industry. Postwar conditions will probably accelerate the use of developments like this packaged electronic motor-control. The two big tubes supply power to the armature of the motor and the pair of smaller tubes energize the field

of milling cutters depending upon load and condition of the metal. Another seeks a practical method of speed adjustment by electronics for compensating for wheel diameter wear in a grinding machine. Other suggestions are: control of gage in cold-rolling strip steel; electronic control of voltage magnitudes by a method other than phase shifting; control of the speed of electric motors independent of load; and electronic control of oil valves in annealing ovens.

Thirty percent of the firms reported that they are now using some form of power conversion equipment. That only 7.1 percent listed problems in this class indicates that the potential uses of this type of electronic equipment are fairly well known. A few of the problems mentioned follow:

"We are considering vacuum tube frequency chargers to operate high-speed motors."—Manufacturer, internal grinders.

"Electronic frequency converter with stepless frequency output—for use on machine tools where squirrel cage induction motor speeds above 3,600 r.p.m. are required—as on grinding wheel drives."—Manufacturer, bevel gear machinery.

"A device which would automatically apply the proper current density for the load of work and cut off current when the proper thickness is obtained during electroplating operations."—Manufacturer, aircraft.

Counting, sorting, weighing and inspecting devices—as distinguished from those that regulate or control—were reported by 21.6 percent of the metal-working firms. The greatest interest seems to be in X-ray inspection, surface analyzing, and counting. The most frequently reported problem is flaw detection.

Numerous potential applications of electronics as inspection tools are envisioned by men engaged in metal-working. Reports indicate that present electronic equipment used in this connection has proved highly adaptable and efficient.

A few of the many suggestions include: inspection of commutators to measure skew of bars accurately; inspection of engine parts for internal flaws and quality of plating, carburizing, painting and other process treatments; photoelectric scanning for the separation and sorting of incorrect mica segments from good units; testing and standardization of surface finishes.

This group includes electronic equipment which utilizes induced molecular vibration by use of frequencies above the audibility of the ear. No present applications of such equipment are reported in the survey, but several metal-working firms expressed their interest in its potentialities, especially for supersonic detection.

Supersonic Units Foreseen

A company engaged in manufacturing automotive vehicles foresees the possible development of supersonic inspection equipment to detect flaws in castings. Another firm expressed interest in the possibility of supersonic wave reflection apparatus to detect interior flaws in large bodies of metal. Casting inspection by sound was also advanced as a potential instrument.

Measurement and analysis devices are the most widely used electronic equipment among all industries. In the metal-working field, they are outdistanced only by control devices. A total of 162 metal-working companies reported present use of 3,213 devices.

The comparatively small number of potential applications advanced, as in the case of power conversion, indicates that the potential uses of such devices are well known, hence a problem that can be handled by these devices is not likely to be considered a "problem" by the plants reporting.

One firm believes that pH determination of process solutions, such as anodizing and plating, would be more accurate and result in better quality if electronics is applied. Another company questioned the possibility of electronics in meeting problems of stress relief.

Electronics as a replacement for micrometer measurement to determine the thickness of plating on plated pieces is suggested.

A firm engaged in manufacturing ball bearings suggested:

"An electronic method for determining the depth of case hardening in cast iron railroad journals; these parts are flame-hardened and case depth must be determined without injury to them. Inside radius is approximately 4 in. and length is 15 in. Test probes should be portable to allow for exploring all parts of this inside hardened raceway."

Measurement of the thickness of piston rings as they come from the grinders is advanced as a possible use for electronics. This would result in swift acceptance or rejection of rings.

Electronics is out of the realm of imagination in safety applications. The extensive list of electronic devices already accepted as dependable safeguards bears out the ingenuity of engineers in this field. Nearly all types of electronic safety devices were reported to be in use. The principal types, however, were for stopping machinery and indicating combustion failure. Comparatively few problems were expressed in survey reports.

A manufacturer of sheet-metal products suggested development of a photoelectric safety device for punch presses to protect operators from injury and equipment itself from improper ejection of stamped parts or scrap.

In all eight classifications the survey proved that metal-working companies anticipate the incorporation of electronic attachments in many postwar machines. Such devices will have to prove their functional value, however, before they will be accepted. The survey further showed that industrial problems advanced by some companies have been solved satisfactorily elsewhere by an electronic device.

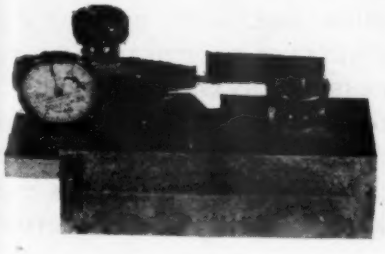
Circular Milling ON A HOBBING MACHINE

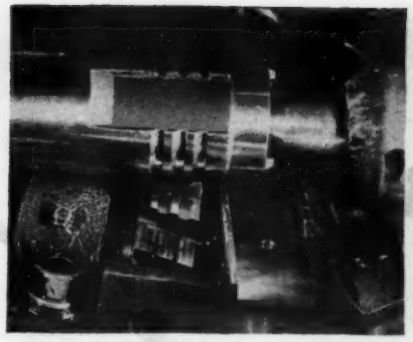
A GUN MANUFACTURER recently contracted to make barrels for a 60-mm. machine gun, the breech end of which is designed with lock rings. These rings have one vertical flank and one sloping flank, something similar to a buttress thread.

Manufacture has been simplified by the application of circular milling to a Barber-Colman Type A hobbing machine with special features added. In order to mill the straight-sided form it was first necessary to design a ground form-relieved cutter. The cutter was made with a 7-deg. taper to provide ample cutting clearance when finishing straight side of the lock rings on the gun barrel. Thus, in order to reproduce the correct form, it is necessary to rotate the cutter on an axis having an angle of 7 deg. to the axis of the gun barrel.

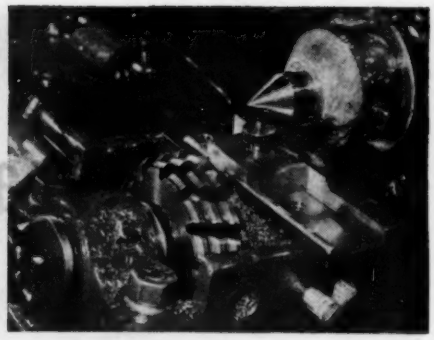
The general procedure is shown in the accompanying views. Locating the cutter carriage is arranged through a special handwheel provided on the feedscrew worm gear shaft. One complete turn of the handwheel advances or retards the cutter 0.005 in. A very accurate adjustment is possible and location is made to the zero reading.

The hobbing machine is not geared up in the regular manner. In fact, at no time are the regular gears engaged. The index gears in this type of work become the circumferential feed gears. They are arranged to provide a feed of about 0.001 in. chip per tooth of the cutter. With this set-up 80 to 90 pieces are obtained for each resharpening of the cutter. The rate of production is five minutes for each part, floor to floor time.

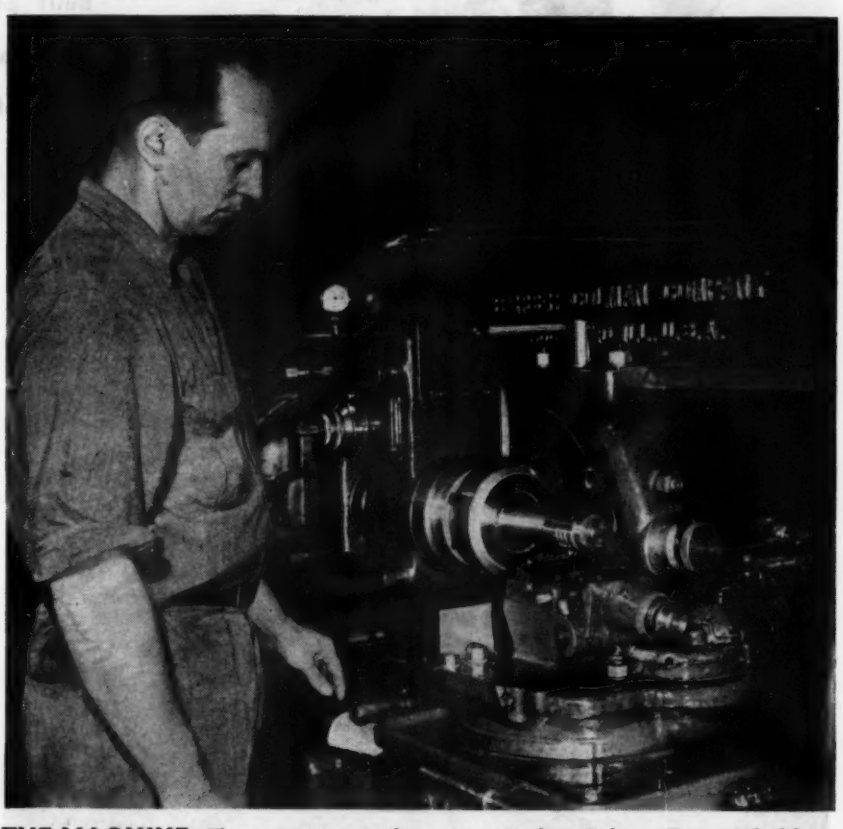




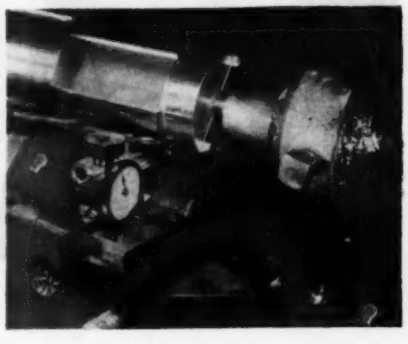
THE JOB—Locking rings were required to be machined at the end of a machine gun barrel. One flank of each ring is perpendicular to the axis of the workpiece, which raised the problem of cutter clearance. Material: a modified SAE 4150 steel, 285-320 Brinnel, tough and stringy



THE TOOL—To give needed clearance the cutter is made with a 7-deg. taper and is set at a 7-deg. angle to the work axis. The limits on form and pitch are +0.00025 –0 in. One cut conventional milling is used with a cut 0.111-in. deep and the cutter operating of 63 s.f.p.m.



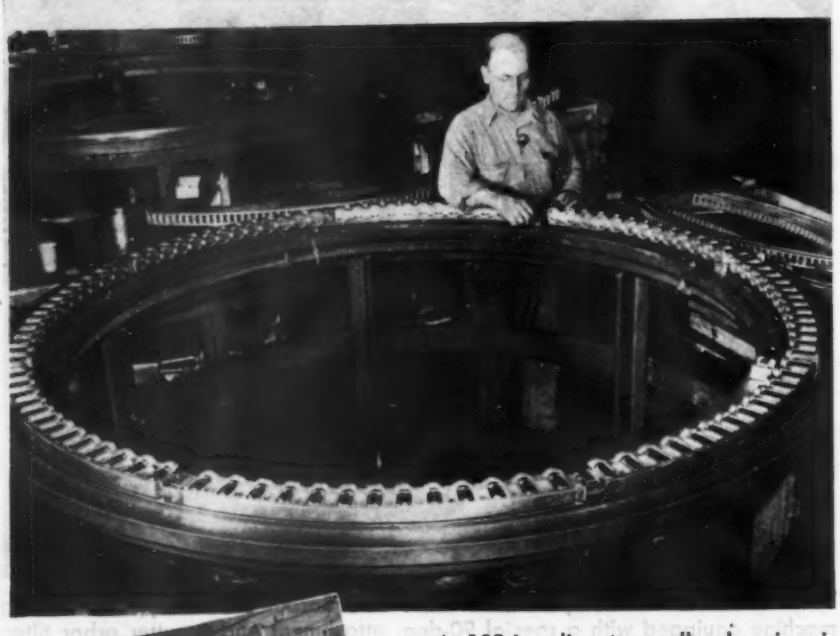
THE MACHINE—The operation is done on a Barber-Colman Type A hobbing machine equipped with a special 90-deg. attachment and a cutter arbor tilted to the 7-deg. angle. Integral with the 90-deg. cutter swivel unit is a gage holder used for set-up purposes



THE SET-UP—The location of the form on the workpiece is held to close tolerances. An adjustable gage block registers the distance from the first row of teeth on the cutter to the near side of the gage with the cutting face set perpendicular. The gage block is used for setting the zero point on a dial indicator which is then fitted into the gage holder for locating the cutter arbor with the shoulder of the barrel

Naval Ordnance Plant Builds 5-in. Guns

This Westinghouse-operated war-built plant holds limits of ten thousandths of an inch on gun assemblies weighing many tons



A 108-in. diameter roller bearing in the base of the gun supports its weight during the lateral, or training, movement. Rollers for these bearings are selected in steps of 0.0001 in. by means of a Sheffield Shadowgraph and are assembled in matched sets

The training ring with internal gear teeth is fastened to the base by means of tapered bolts. These are tightened with a torque wrench to insure uniform tension and freedom from distortion

ONE OF THE Navy's most effective weapons in this war is the 5-in. 38 cal. gun. This weapon has long been standard on many types of Naval vessels, but the newly designed mount and controls are now giving to it a degree of accuracy that far exceeds past performance.

The present dual-purpose mount makes this piece of Naval Ordnance a fine anti-aircraft cannon—one which can fire higher in the air than any plane can fly. It is deadly, too, against surface targets and enemy land installations.

A telegram to the Commanding Officer and the workers of the U. S. Naval Ordnance Plant, at Louisville, Kentucky, signed by Rear Admiral W. H. P. Blandy, until recently Chief of Bureau of Ordnance tells just how useful this weapon is with its modern mount:

"THE FIRE POWER OF 5-IN. GUNS ASSEMBLED BY YOU WAS A TELLING FACTOR IN OUR SUCCESSFUL INVASION OF SICILY. A DESTROYER EQUIPPED WITH LOUISVILLE ASSEMBLED MARK 30 MOUNTS SPEARHEADED THE SHORE BOMBARDMENTS THAT

ENABLED OUR TROOPS TO LAND WITH A MINIMUM OF CASUALTIES. THIS WARSHIP FIRED 800 SHELLS IN THREE HOURS WITHOUT MATERIAL FAILURE. LATER SHE HELPED TO REPEL AN ENEMY COUNTER ATTACK, KNOCKING OUT FOUR BIG NAZI TANKS AT TEN THOUSAND YARDS. THE BUREAU EXTENDS THANKS TO ALL OF YOU WHO HELPED TO ASSEMBLE THIS EXCELLENT ORDNANCE."

The Louisiville Plant to which the Admiral referred in his wire is one of several new plants built by the Navy to supplement and extend the manufacturing activities of the Washington Navy Yard. It is managed and operated by the Westinghouse Electric Corporation under Navy supervision. So wide is the variety of work which this plant handles, that it more nearly resembles a job shop than a quantity production plant. In addition to manufacturing parts itself, the arsenal performs the final assembly and inspection on many kinds of Naval Ordnance for which parts and subassemblies are made in other Naval arsenals or in the plants of commercial contractors. The 5-in. gun mount falls into this class of equipment since many of the subassemblies come to Louisville partially or wholly completed.

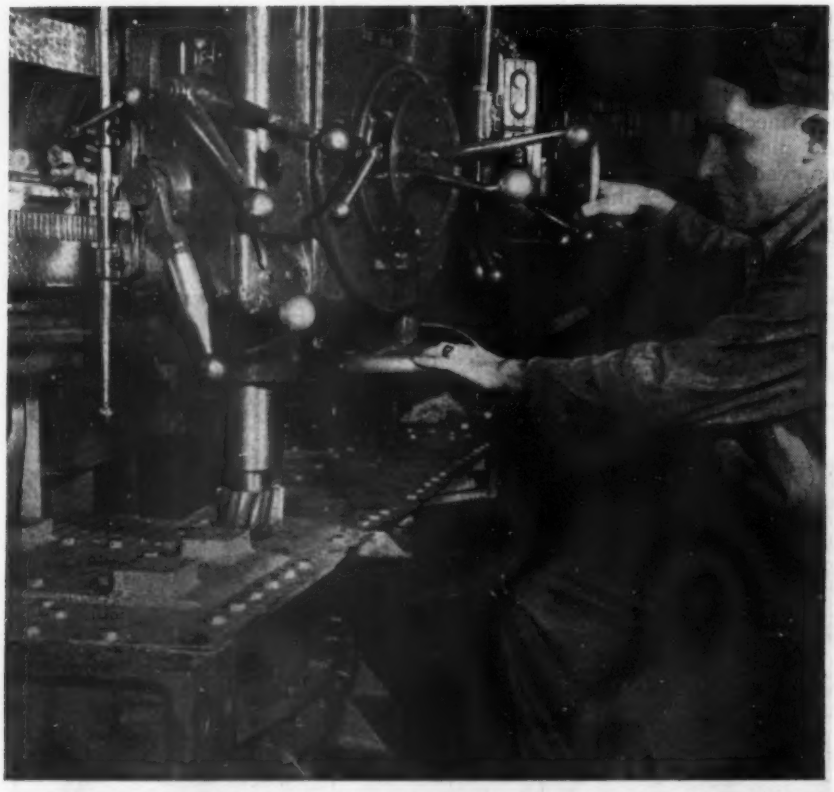
To obtain the accuracy of which this gun is capable, it is necessary to work to limits usually found only in small precision parts whereas the gun mounts parts are of necessity massive. The mounts are designed to be operated by three different kinds of control: remote automatic control from the fire control station, mechanical control at the gun, and manual control at the gun in the event of failure in the mechanical control. Both the training and elevation of the gun have high and low speeds which are obtained by simply throwing a lever. The advantages of the interlocking control are apparent, but to obtain them, an intricate mechanism is necessary.

Backlash in all gearing must be held to a minimum in the training and elevating mechanisms. At the same time, these mechanisms must

One of the first steps in assembling the gun mounts is to put the roller bearings in place and then lower the carriage into them. The teeth on the gearing are bench marked so they will always mesh in the same way. Wooden spacer blocks center the carriage when it is lowered so the bearing will not be marked. It is important that the bearing ring be parallel to the ship deck

A man inside the gun mount checks the bearings of the training gear teeth and stones them to remove all tool marks and high spots. In this way a good bearing and continued accuracy of the training ring are insured

A torque gage on the training pinion measures the amount of pull needed to move the carriage. It must not exceed 40 in.-lb. starting load or 30 in.-lb. running load to guaranty free operation in service



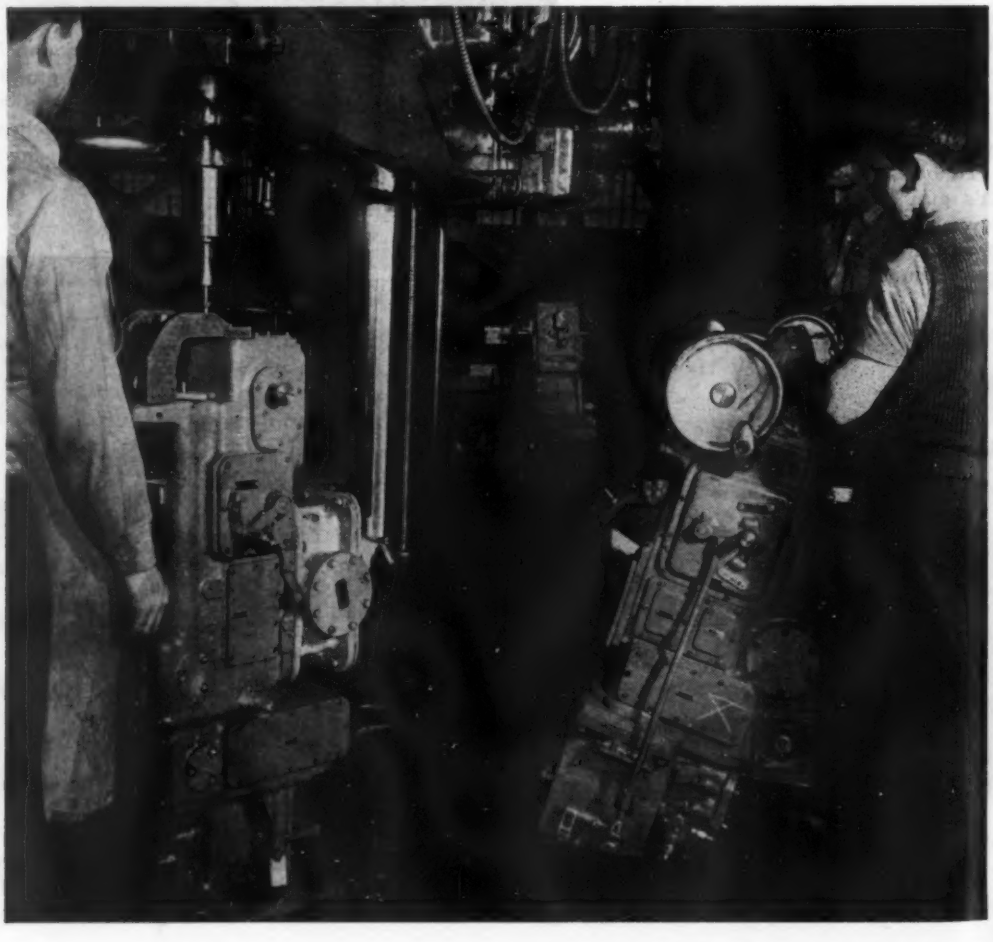
Pads for mounting the hydraulic control unit to the base are milled in a radial drilling machine. A large end mill is mounted in the spindle for this purpose. In the same set-up four holes are drilled in the pads using a jig

operate freely within a certain measured torque if they are to pass the rigid Naval inspection. Training, that is the horizontal traverse of the gun, is obtained by mounting the carriage on roller bearings and moving it by an internal gear and pinion. An error of only one minute of an arc is permitted in this gear ring. The lateral movement of the mount in these bearings must be held within 0.002 to 0.004 in.

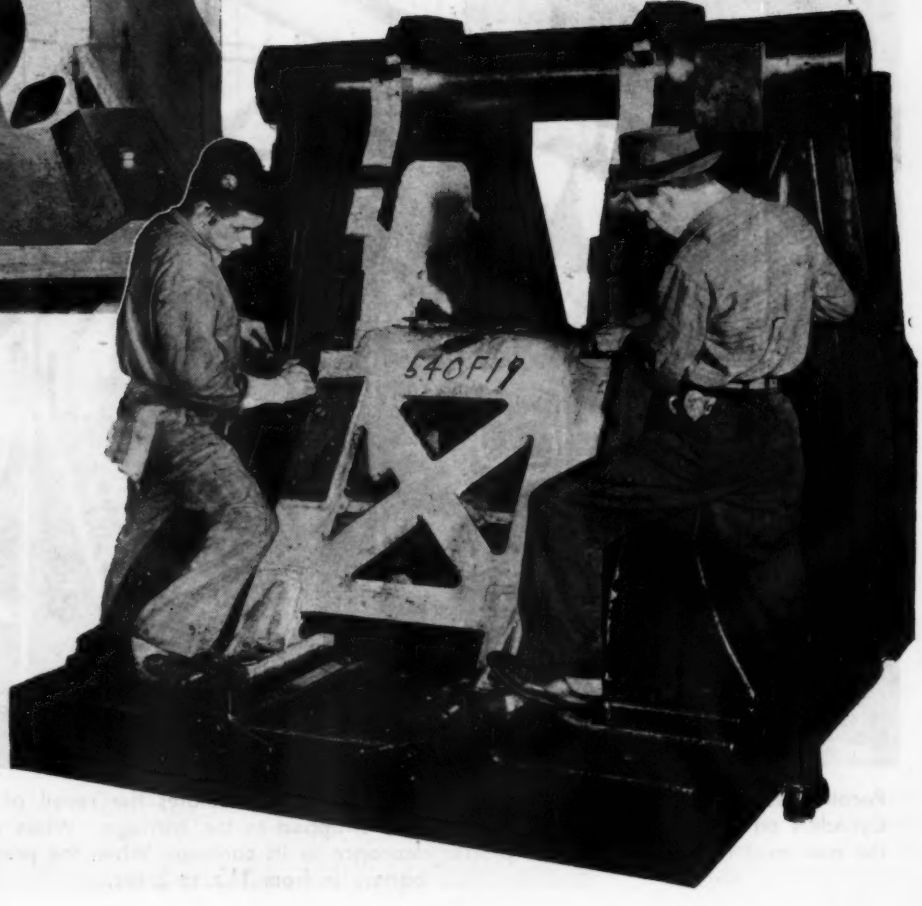
For elevation, the gun sleeve is mounted on preloaded trunnion bearings. The elevating arc and pinion are held to a backlash of 0.0015 to 0.0025 of an inch. The mechanism which controls the telescopic gunsights is mounted entirely on preloaded ball bearings and no backlash is permitted. The gear ring for training the gun is hardened either by induction heating or flame hardening. The roller bearing in the base which supports the gun is in reality two bearings, one of which is horizontal, and the other vertical.

Despite the size and precision of the guns and mounts, they are being built by semi-skilled workers many of whom had no prewar shop experience. A large percentage of them are women.

Elevating handwheel brackets are mounted on fixtures around the base of a radial drilling machine to finish holes at various angles. This arrangement enables set-up men to precede the machine operator, thus saving down time for the drilling machine



After assembly a handwheel bracket is mounted on a swiveling base to check gear clearances. Bases in 0.001 in. steps are placed back of the bevel gears to minimize the backlash. Teeth are scraped to a good bearing. Note the magnetic lamp which holds itself against the casting just above the tip of the hand scraper



Bearing rails within the carriage must be held to plus or minus 0.002 in. and are scraped if necessary. The end support pad is scraped for height and parallelism to the rails by means of a special fixture

The carriage is scraped on the pads which locate the cross bracket. A target fixture is used for the purpose. A heavy arbor insures alignment between the trunnion bearings and the fixture, thus assuring parallelism between the bearings and the pad

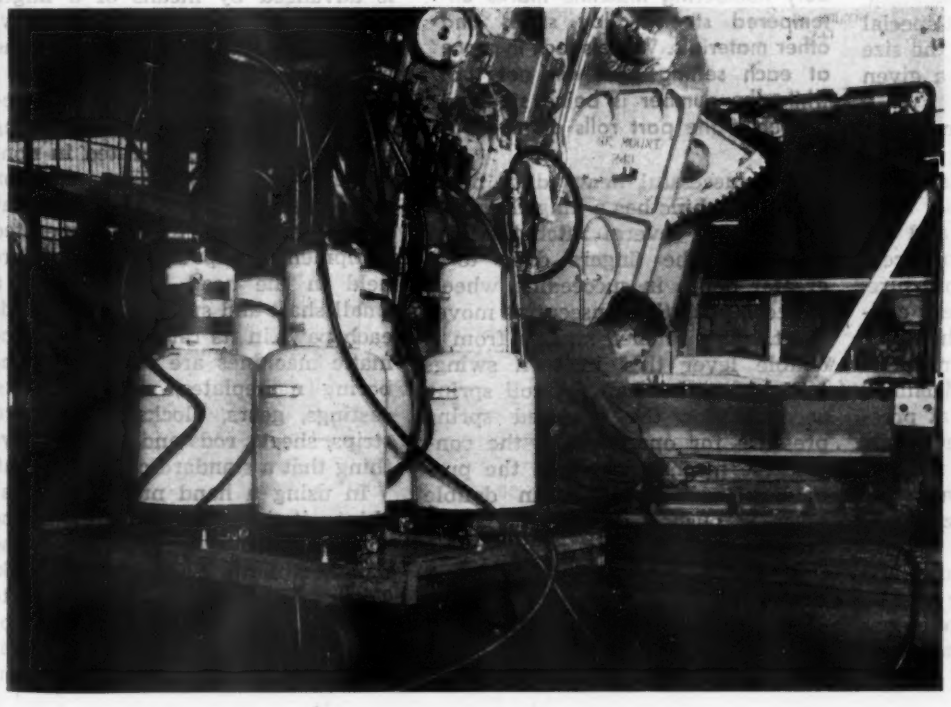
Naval Ordnance Plant Builds 5-in Guns

(CONTINUED)

After assembly the gun is given an exhaustive series of tests for accuracy. The inspector here is shown checking the action of the training circle. With the aid of a microscope the actual movement of the carriage is noted in relation to the protractor marked on the base for various positions of the handwheel. An accuracy of 1 min. is checked at 5-deg. intervals

Recoil is tested in a fixture known as the "kick stand" which simulates the recoil of the gun when a shell is fired. Cylinders on the muzzle end of the barrel are strapped to the carriage. When a 155-lb. air pressure is applied the gun must recoil 25 in. to the proper clearance in its carriage. When the pressure is released it must return to battery in from 1½ to 2 sec.

Bore sighting is done on high and low targets. The borescope inside the gun barrel is coordinated with the checkerscope and the trainerscope. In their proper relationship these telescopes must follow vertical wires between the upper and lower targets when the elevating mechanism is operated. Backlash between the elevating arc and pinion is held between 0.0015-0.002 in. A log is kept for slight variations in every gun



The guns and mounts use five different kinds of grease. These are conveniently handled from a single dolly. When this unit is piped to an air line, high-pressure lubrication can be obtained from any container by using the proper hose

Automatic and Non-Automatic Machines Meet Varied Marking Requirements

BY H. O. BATES, THE ACROMARK COMPANY

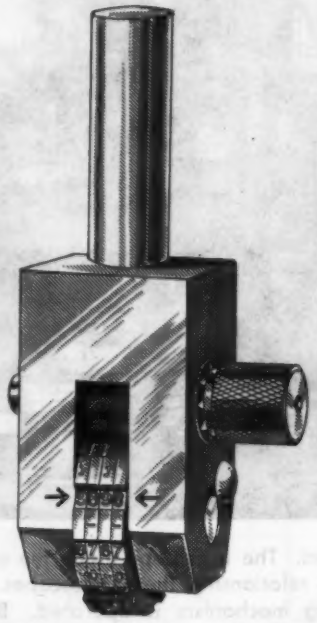
Cylindrical, conical and odd-shaped parts require special marking devices and fixtures to meet mass production needs. These developments and other marking methods are reviewed

VARIED PROBLEMS in marking metal equipment and parts have led to development of numerous different types of automatic and non-automatic marking machines. Many specific machines have been designed to cover a range of marking requirements in the interests of economical operations.

Marking tools that can be used as either hand or press instruments fulfill demands for short-run or volume production and for marking metals of different hardness characteristics. Most of the automatic devices are produced to meet special requirements which vary in the size and style of characters for a given marking job.

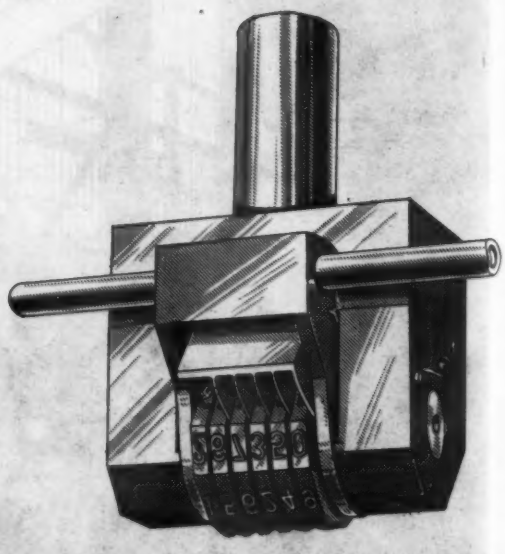
Numbering machines for metal stamping are commonly called "numbering heads." These heads are heavily constructed for use in a power, foot or arbor press and are usually subjected to tons of pressure. To withstand this pressure, wheels bearing the characters cannot contain operational mechanisms. The frame is usually made from one piece of bar stock and is machined lengthwise of the bar so that pressure will be applied with the grain.

Since the hole in the ram of presses varies in size, the shanks are made either to required size to fit the press when the frame is machined or a standard size of shank is designated that suits the size of the machine and sleeve adapters are furnished when necessary to make up the ram hole size.



Capable of being operated in power, foot or arbor press, this heavy-duty numbering machine marks untempered steels, alloy steels and other materials. Wheels lock in place at each setting and will not turn while the number is being stamped even if the part rolls or moves

One successful heavy-duty numbering machine has a hinged ratchet part having several ratchet fingers attached. The fingers drop to a greater depth in succeeding wheels to accomplish the consecutive movement. The ratchet swings from a double lever that in turn swings from the main shaft. A coil spring accounts for the required spring pressure for operation of the consecutive mechanism when the protruding rod of the main double lever is pushed downward. When set in a punch press, a protruding arm attached to the press frame forces the lever down at each upstroke, thereby advancing the characters.

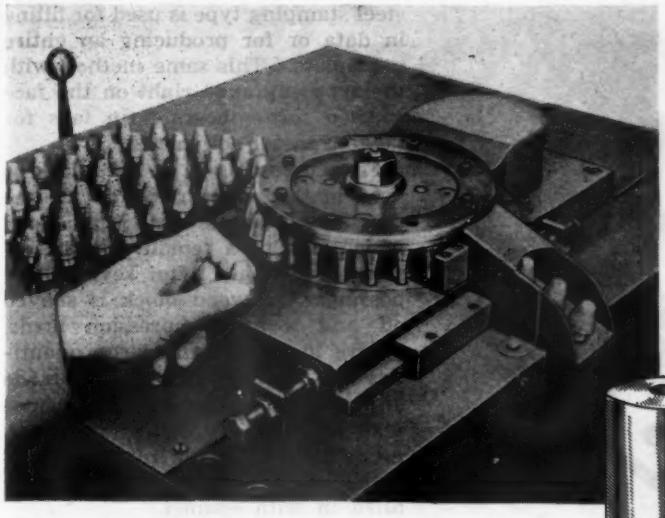


Consecutive and repeat numbering is performed by this automatic head. The protruding arm is attached to the press frame to move a figure at each upstroke

Various types of machines are used in addition to the standard numbering head. One is a lever-operated device used for placing irregular numbering or assorted numbering on random parts. Each wheel is advanced by means of a finger lever which pushes down a pawl against a ratchet, advancing the wheel one character.

The same strength factors required for automatic numbering heads must be incorporated in non-automatic types. The common mechanism of non-automatic machines is similar to lever-operated equipment, except that the pawls are held in the head by means of a small shaft and spring tension holds each pawl in its ratchet. Non-automatic machines are used for numbering nameplates, machine parts, castings, gears, blocks, rings, bars, strips, sheets, rods and, in fact, anything that a standard chisel will cut.

In using a hand numbering machine, it is common to hold the shank. Often a rebound after the hammer blow will deface the mark. To overcome this it is advisable to lift the shank as the blow is applied and thus the rebound is avoided. A better practice, however,



High-production marking of small parts is accomplished by machines similar to the one shown. Small parts are fed onto the revolving disk and carried past a concave marking die

is to hold the machine body, resting the fingers against the product being marked.

Motor-driven equipment has virtually replaced hand- and foot-operated machines for high-production marking of small parts. For the most part, these machines incorporate the principle of a revolving disk with recesses or raised mandrels in series. Small parts are fed onto the disk and carried past a concaved marking die held by a chuck at the side of the machine.

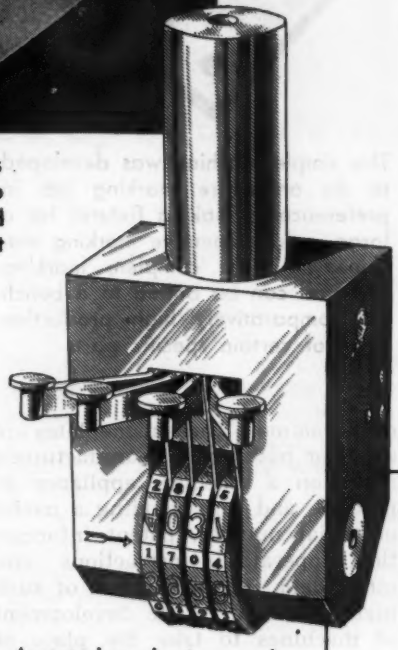
Straight line, easily engraved dies are recommended for marking all cylindrical and conical parts, such as bushings, tubes, rods, bars, shafts and rolls. Flat surfaces are marked with roller dies or rotary-type holders with segment-type inserts.

Suitable Fixtures Essential

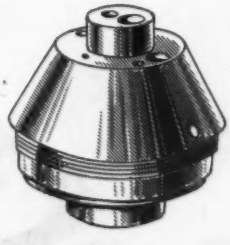
An important phase of marking is the use of suitable fixtures to accomplish special classes of marking by the use of stamps, dies or type; fixtures to use in marking machines to hold odd and special-shaped parts while they are being marked; and fixtures for special adaptations of entire or partial marking machines.

The most commonly used type of fixture is the standard set of cradle rolls used for holding a round part and allowing it to rotate while being marked. The cradle roll may take many special shapes and forms because of the characteristics of a part. Mandrel-type fixtures are used for marking rings, cylinders, collars and bushings.

If only a few pieces of an odd-shaped part are to be marked, then the fixture should be constructed as inexpensively as possible. If a fixture is necessary for a volume-production run, then strength and durability must be incorporated in its construction.



Assorted numbering can be accomplished with this lever-type marking head. When a lever is pressed the wheel which it controls advances one unit

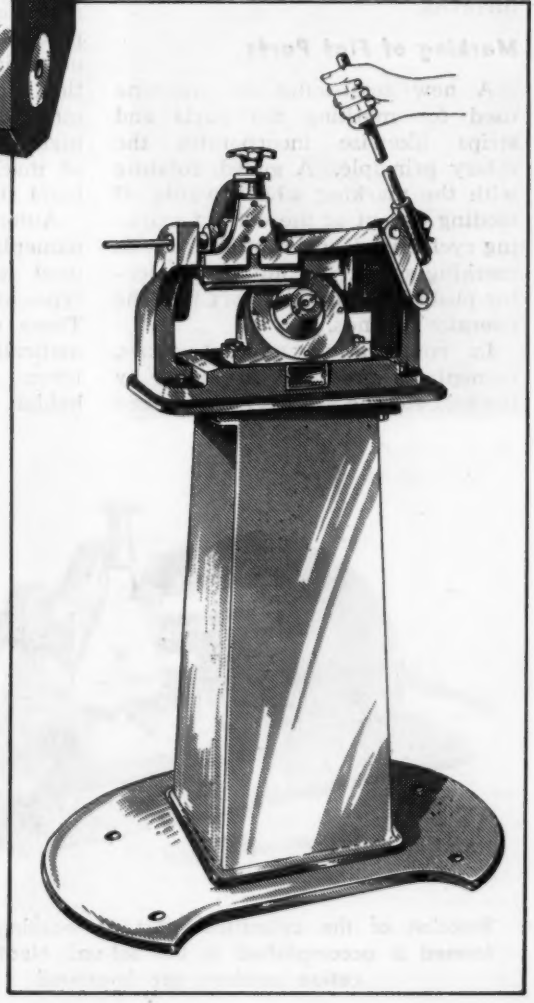


Special adaptations permit use of this machine for marking virtually any shape of part. A special geared mandrel set-up is shown for controlled marking of a cone-shaped precision part that has only limited surface against which marking pressure can be applied

Special Marking Requirements

Manufacturers of such items as electrical fittings, which vary in size from minute objects to clamps and terminals of considerable proportion, sometimes find themselves confronted with temporary high production on an item. The part may not be adaptable to marking on standard machines and often it proves economical to purchase a complete special marking machine rather than construct a suitable fixture or fixtures. This is an important consideration.

Generally, such special machines can be operated by unskilled workers with a minimum of training. One type of small hand-operated machine is available for marking one line of lettering or numbering into steel ferrules, collars, tubes,



sleeves, bushings, rings and caps of steel, brass, cast iron, bronze and other metals and materials. Several of the machines can be bolted to a bench and used to gain high production. The machine is constructed so that mandrels can be changed for marking a variety of parts and the pressure arm is adjustable for marking depth.

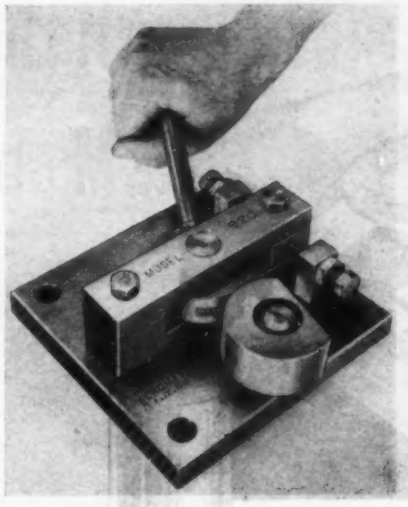
Another special machine produced by Acromark is designed for marking accurately around the periphery of gages, timers, guides or speedometer wheels and is many times faster than the old engraving method. As a crank is turned, the geared mandrel holding the part rotates with the type holder as it slides past. Precision control places the marking in exactly the positions desired on the periphery. Often the marked characters are enamel-filled to give them more prominence.

Several machines have been developed for marking from one to four lines of characters on shells. The "rotary principle" has proved the most advantageous method of producing uniform marking. The dies used outlast stamping dies because there is no blow or shock involved.

Marking of Flat Parts

A new semi-automatic machine used for marking flat parts and strips likewise incorporates the rotary principle. A guard, rotating with the marking wheel, wards off feeding except at the correct marking cycle but does not interfere with marking speed. An automatic ejector pushes the marked part into the operator's hands.

In comparatively recent years, nameplates produced in metal by the acid etching process have become



This simple machine was developed to do an entire marking job in preference to making fixtures for a large, more expensive marking machine. It is a complete marking unit and can be bolted to a bench for comparatively high production of certain specific parts

quite common. These nameplates are used for putting the manufacturer's name on a machine, appliance or product, and for including a model or serial number, patent information, operating instructions and other data. Increasing use of such plates resulted in the development of machines to take the place of hand stamping.

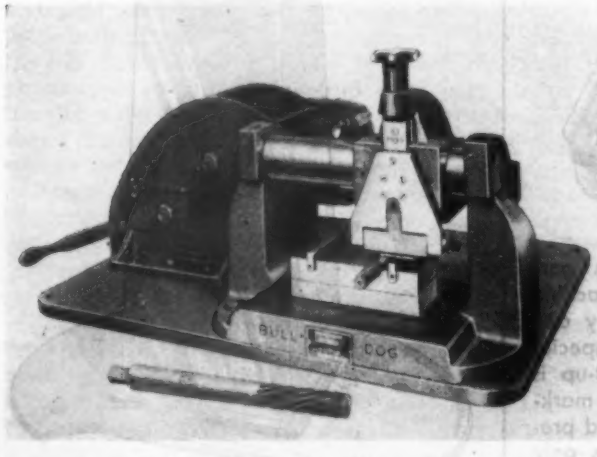
Automatic numbering heads for nameplate numbering are commonly used in punch presses and other types of hand, foot or power presses. These numbering heads are automatically advanced by means of a lever. A punch press with a type holder carrying multiple pieces of steel stamping type is used for filling in data or for producing an entire nameplate. This same method with the type engraved right on the face is used for embossing tin tags for tagging metal shipments.

For embossing, a wood block is used in the upper ram and an impression is made into the block which acts as a female for successive embossings. After several embossings, the wood block is shaved off and a new impression made. Where long runs and large quantities are involved, the block is made of brass or steel. Stamping of nameplates results in distortion which necessitates that the plate be flattened so that the lettering can be filled in with enamel.

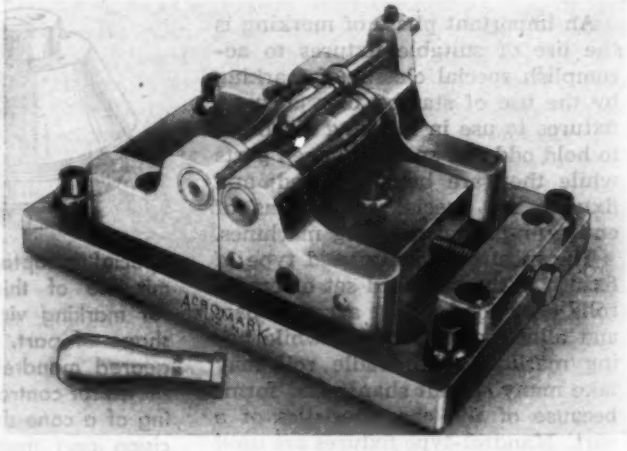
Plastics Replace Fiber

Some products require non-metal nameplates and up until recent years such items were usually made of compressed fiber. New colorful plastic materials have more or less replaced fiber for nameplates because the latter material scales and warps when subjected to dampness and tends to fade.

Some companies have developed methods of acid etching or printing plastics, but perhaps the most commonly used and satisfactory method of marking plastics, particularly with changing data, is hot-stamping. Where color is needed to contrast with the basic plate, a transfer tape is placed between the die and nameplate, resulting in the application of a pigment applied with heat. A machine has been developed for marking round pieces, such as cylindrical parts and rods of plastic, by rolling the part as a flat die applies pressure and heat through the color transfer.



Rotation of the cylindrical part as marking is performed is accomplished in this set-up. Neat identification numbers are imprinted



Holding fixtures are important in marking processes. Cradle roll fixtures are generally used. The fixture shown is specially adapted to the part

Practical Ideas

HAVE YOU A PRACTICAL IDEA?... If so, send it in. Your idea will help other men, in other shops, who have a problem similar to yours. We pay for acceptable contributions prepared exclusively for this publication

Hat Section Bends Corrected and Twists Removed by Straightener

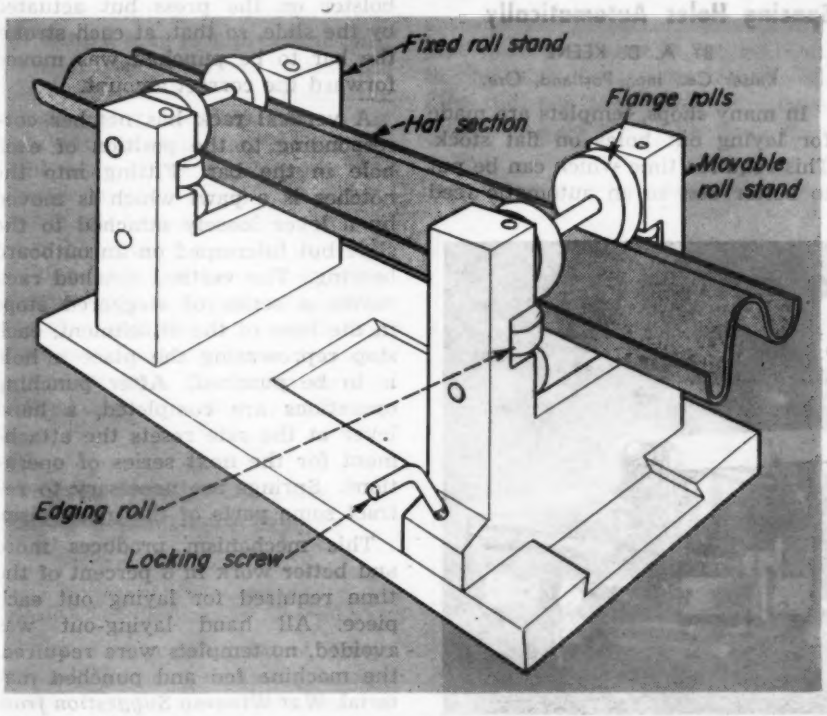
BY GROVER WINDALL EASLEY
Douglas Aircraft Company, Inc., Santa Monica, Calif.

Some types of hat sections are formed from strip stock by the use of a series of rolls which progressively shape the strip until the product is finished. Naturally, these rolled sections are not always straight, so a secondary operation has to be made to obtain a straight piece to work upon.

Two stands were machined so that each one supports upper and lower pairs of rollers which bear against the flanges, while edging rollers bear against the side of the flange and shape up the stiffener. These rollers bear with equal pressure upon all points of the hat section and hold it securely when pressure is applied to straighten it.

To true-up the hat section, a length is pushed into the roller straightener, then pressure applied in the proper direction removes any twist or bend which might occur. In reality, the roller frames are a form of vise.

Previous practice was to put the section in form blocks and apply pressure. These blocks did not prove to be entirely successful; when one fault was corrected another would appear.



Rolls hold the hat section in position while straightening any twists or bends that may occur from previous forming operations

The hat sections are straightened easily when they are pulled through the rolls with the consequence that a higher quality of work results because the opportunity for further distortion is minimized. The time required to straighten hat sections is cut in half, because each fault is corrected as the sheet metal section is moved through the rolls. *War Winning Suggestion Submitted to the Board for Individual Awards, War Production Drive.*

Boring bars of this type were made up in various lengths

Boring Bar Bits Held Without Setscrews

BY C. M. HUNTLEY

It is a well-known fact that a setscrew will not hold small bits in boring bars. This nuisance was solved by drilling a hole in the end of a mild steel bar slightly smaller than the distance across the corners of the tool steel bit, then driving the steel into the hole; the corners prevented the bit from turning and held it from backing off while under load.

Angle or straight tools can be made by drilling the hole as desired. Worn toolbits can be placed in small-

er bars. Boring bars of various diameters are necessary for smaller sized holes. Length depends upon the depth of the hole. Cutters are ground to suit conditions.

Diamond Saw Quickly Slots Binocular Prisms

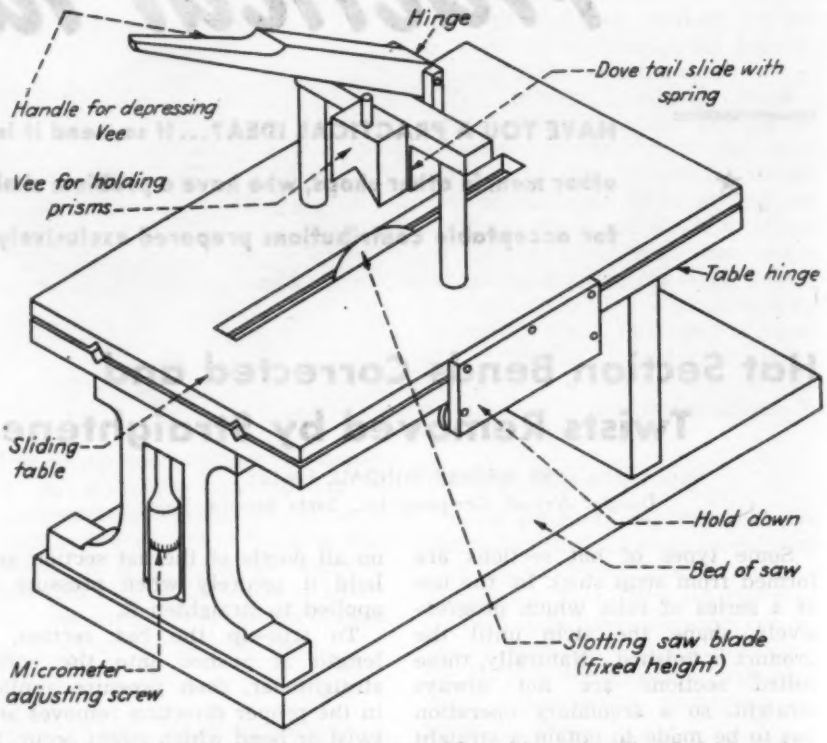
BY DARNELL G. TALBERT
Washington Navy Yard

Binocular prisms had been slotted by the use of a milling machine. This required considerable time to set up and cut the slot in the prism; the whole method was slow and the demand was increasing.

To shorten production time, an effort was made to reduce the set-up and slotting process. This was accomplished by the use of a quick clamping device in conjunction with a diamond saw. Feeding was achieved by mounting the prism holding mechanism on a sliding table, a slot in the center of the table provides space for the diamond saw. For vertical adjustment, micrometer screws move the table to cut the prism to the desired depth of slot.

A block, with a V-cut in its lower face, can be moved vertically by a lever. The prism is placed on the table and the V-slide brought down with the lever. This action clamps the prism in the correct position and holds it firmly while the table is moved toward the diamond wheel. No set-up time is necessary.

This arrangement has turned out four times as much work as was done by the milling machine method and the same degree of accuracy was obtained. *Suggestion Submitted under the Navy Employees' Suggestion Program.*



Clamping a prism in position on a movable table reduced set-up time for cutting slots by the use of a diamond wheel

Punch Press Attachment for Spacing Holes Automatically

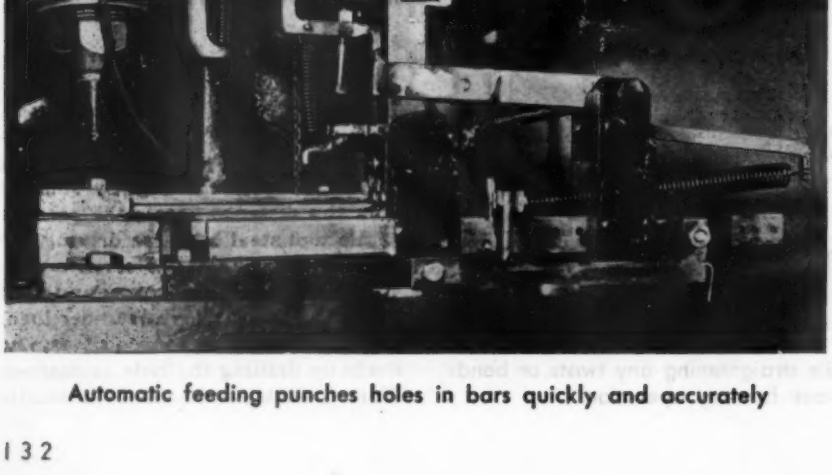
BY A. D. KEENE
Kaiser Co., Inc., Portland, Ore.

In many shops, templets are made for laying out holes on flat stock. This requires time which can be put to better use, so an automatic feed was made which located the bar in the correct position for each hole.

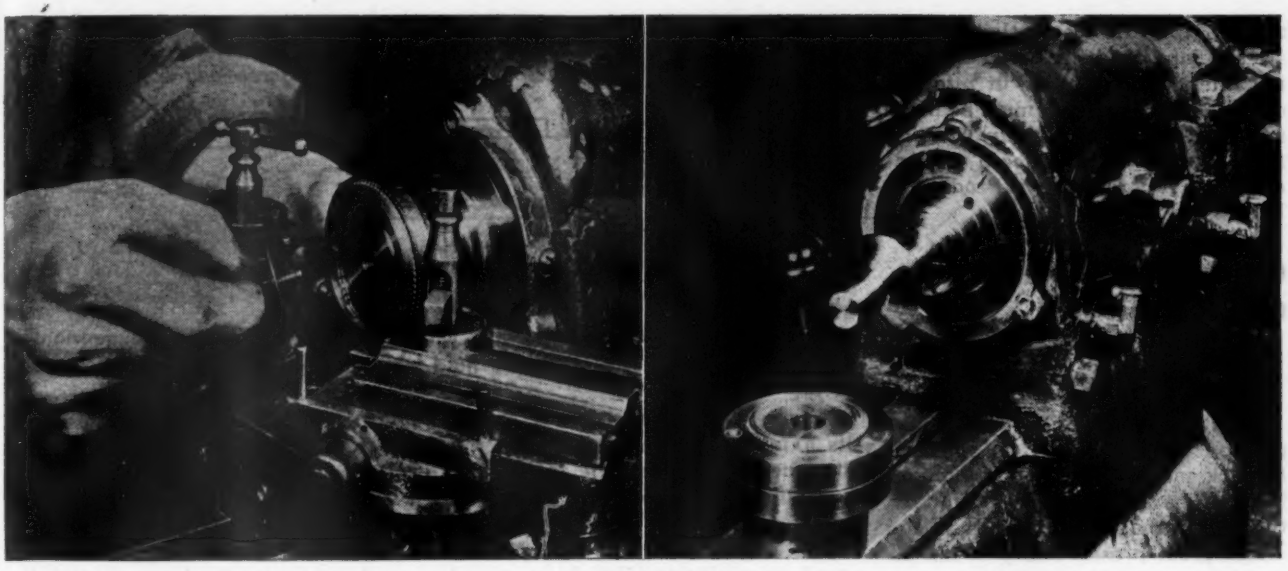
To provide a more rapid means for punching these holes, an automatic feed was fastened to the bolster on the press but actuated by the slide, so that, at each stroke, the bar to be punched was moved forward the correct amount.

A vertical rack has notches corresponding to the position of each hole in the bar. Fitting into the notches is a pawl which is moved by a lever loosely attached to the slide but fulcrumed on an outboard bearing. The vertical notched rack moves a series of staggered stops in the base of the attachment, each stop representing the place a hole is to be punched. After punching operations are completed, a hand lever at the side resets the attachment for the next series of operations. Springs are necessary to retract some parts of the mechanism.

This mechanism produces more and better work in 8 percent of the time required for laying out each piece. All hand laying-out was avoided, no templets were required, the machine fed and punched material. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Automatic feeding punches holes in bars quickly and accurately



Shutter-speed rings, bolted against the chuck required stopping and starting the machine; with a draw-in collet, a round plug with a wide flange supports and clamps the ring while the spindle is running

Shutter-Speed Rings Chucked by an Arbor Gripped in a Collet

BY FREDERICK A. FAZAR
Camera Works, Eastman Kodak Company

Shutter-speed rings had to be held flat against a chuck for machining operations. When a bolt was used to fasten the ring to the chuck, considerable time was required to take out the bolt, put in another piece and tighten the bolt.

By substituting a draw-in collet and using a plug to support the ring, it was only necessary to release the collet, take out the plug, replace the ring and plug, then close the collet again without stopping the machine.

The plug, fitting in the collet, has a wide flange to support the ring against the faceplate or chuck. Because the stem of the plug is round, the lathe can be in motion when entering or releasing the plug. This not only simplified, but speeded up operations decidedly. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Van Stone Flanging-Die Liner Reduces Replacement Expense

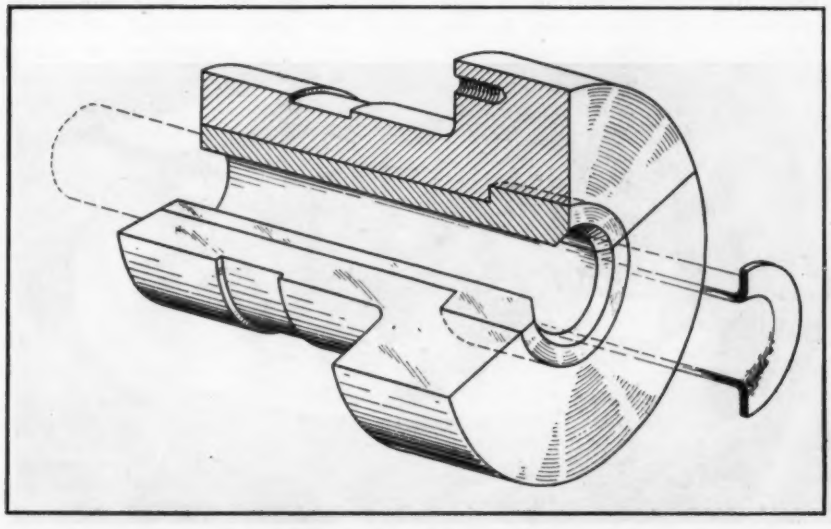
BY HAROLD MONOZON
Bethlehem Steel Company,
Shipbuilding Division, San Francisco

To manufacture Van Stone joints for pipes, it is first necessary to slip the flange on the pipe, then place the end of the pipe in a furnace and bring it to a forging temperature of about 1800 F. At this temperature, the flange can be forged by many blows from sledges, a comparatively smooth surface being obtained by the use of flatters. After forging is complete, the flange is faced off in a lathe or the pipe can be held rigidly and the face machined with a fly cutter.

For large scale manufacture, the flange is slipped over the pipe and the end heated as before, but the pipe is held in a split die; a punch spreads the projecting end of the pipe until the flange is formed. Due to the high temperature involved, dies did not last very long even though a good steel was used.

It was decided to bore out a worn die and place a split liner in it which was of a more durable steel and could be readily replaced. The inserts were made of nickel steel properly heat-treated which were found to last longer than the steel originally used. This replaceable liner saved 60 percent of the material and 50 percent of the labor which would have been involved in the manufacture of new dies; in addition, smaller sizes of bar stock were required.

The savings amounted to $10,000 per year and 13 tons of expensive steel, yet the quality of joint was not impaired in any way. By propor-



Dies for Van Stone joints made with replaceable liners have outlasted solid dies and proved to be more economical

tioning the die correctly, several sizes of pipe can be handled by making liners to suit, all to fit into one die; of course, punches must be made for each size of pipe. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

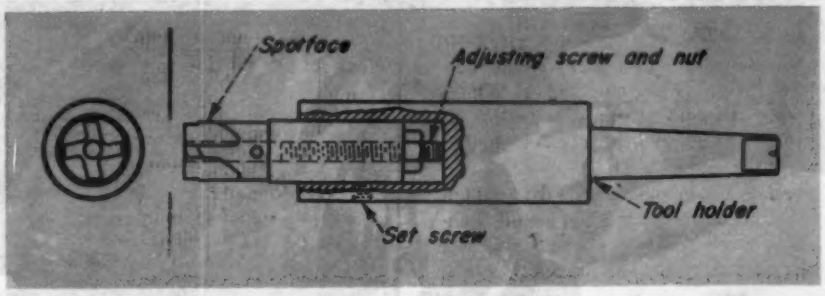
Counterbore Toolholder for Close Tolerance Work

BY THOMAS ROCK
The Firestone Tire & Rubber Co., Akron

Aluminum has a high ratio of expansion due to the effect of heat. Because much heat is generated during cutting operations on aluminum, the work must be done fast and under great pressure to prevent the temperature of the metal from increasing to the point where there will be a change in dimensions.

To minimize heat conduction, the tools must be sharp; to finish to size quickly, much pressure must be applied to get the cut to the correct depth in a very short period of time. Because of the axial pressure required to force a counterbore into the work, the tool may back away from the cut. Setscrews are not always reliable in holding parts in a fixed position, so a long stud with a locknut is used to provide a definite back-stop in the toolholder for the counterbore. Rotation between the holder and counterbore is prevented by a setscrew passing through the toolholder shell and bearing against a flat spot on the counterbore shank.

With this arrangement, the tapered shank of the counterbore is driven solid where it will not change position, the counterbore is set in its axial position by the end of the stud bearing against the toolholder, so a solid line of metal to metal contact opposes any movement and makes holding to close tolerances a good possibility. For high speed work such as will be required for working aluminum, the setscrew in the sleeve will prevent the tool from leaving the holder even under rather severe working conditions. Consequently, very little spoiled work has been experienced since the adoption of this kind of tool. Rework has been shortened 50 hours per month and scrapped parts reduced to a minimum.



Counterbore backed up by a stud with a locknut enables close dimensions to be held with ease

Parallel and Square Grinding of Pin Ends in Fixture

BY GERALD N. LOWING
Marine Division, Packard Motor Car Co.

A circular fixture, with cross slots in its rim, had been used to grip pins by the use of a clamp. If one end was ground, it was impossible to turn the fixture over and grind the other end and have the second end square with the pin and parallel with the first finished surface. When the clamp was loosened and the pin was turned around to grind the rough end, there was no certainty that the position would be correct.

A method for correcting this fault was to make a series of blocks which would nest the pins in two large notches each of which held six pins. A clamp crowded the pins firmly against the walls of the notch. The tolerances of this block required accurately parallel faces to bear against the magnetic chuck and the notches square with these faces.

When the pins are grouped in the notch and the clamp is tightened a little, each pin is bottomed before the final tightening of the clamp. After grinding one end, the fixture is turned upside down, the clamp loosened, then each pin tapped until it bottoms on the grinding machine table. This scheme does not require the removal of any pins from the fixture nor is their position altered. When grinding again proceeds, the ends of the pins are as parallel as the fixture will permit them to be.

Production was quadrupled, the ends were square and parallel to plus or minus 0.001 in. with fewer machines and operators. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

This fixture holds many pins in position so that both ends can be ground square and parallel within limits of plus or minus 0.001 inch

Chain-Grip Pipe Vise With Toggle Tightener

BY M. L. NIELSON
The Permanente Metals Corp., Shipyard No. 1, Richmond, Calif.

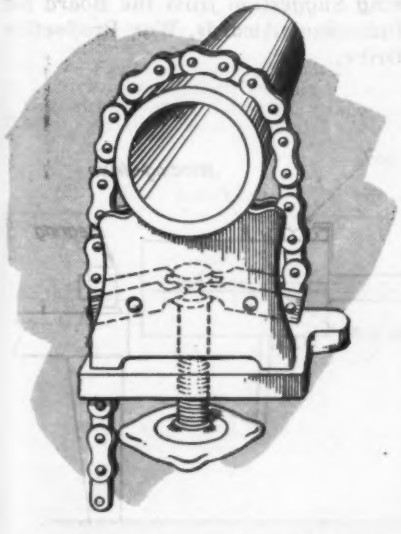
Large sizes of pipe are difficult to grip in a chain vise without rolling the piece because the chain pulls on one side only. If centerlines are laid

out on the pipe, rotation moves these marks out of registration in both horizontal and vertical locations, making rechecking necessary. Where a large amount of pipe is to be fitted, too much time is wasted verifying dimensions.

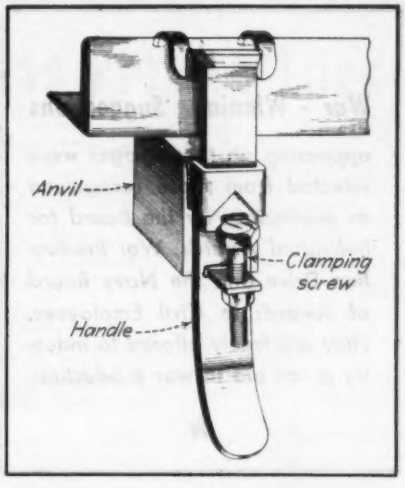
A method to overcome this disadvantage was to utilize the usual base, V-jaws and chain. Between the two jaws of the base a pair of levers is pivotally mounted, each having notched inner and outer ends. In the outer end of one of these levers the chain is bolted; the other lever has a notch at its outer end to fit the chain. The prongs pass between a pair of the chain links. The inner ends of these toggle levers are notched to fit into a groove in the screw head. The vise screw is threaded through the bottom of the base and has a grooved head engaging the pronged inner ends of the levers; a handwheel is on the lower end of this screw.

As the vise screw is elevated to raise the inside end of the levers, the outer ends move downward pulling the chain tightly about the pipe. The downward motion of the chain is the same on both sides, so there can be no rolling and the pipe remains in its original position.

This idea has resulted in a speeding up of the work with the result that accurate pipe fitting has been the outcome. Pipe can be clamped in position and the chain adjusted without rolling. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Toggle levers pull the chain an equal amount on each side, preventing rolling of the pipe



Riveting clamp holds angle, sheet and rivet together while forming the head

Jig Holds Sheet Metal to Angle While Riveting

BY WILLIAM L. ROBERTS
Oregon Shipbuilding Corp., Portland, Ore.

Hand methods, for backing up rivets for fastening sheet metal to stiffening angles, are not satisfactory, because it is difficult to hold the sheet to the angle, also the rivet is likely to leave its hole at the moment riveting begins. With a clamp to hold the sheet to the angle while the rivet is in position, and a block of metal heavy enough to back up the rivet, forming the head can be done very quickly.

A steel block has a handle and clip welded to it: Through the clip passes a flat bar with a hook fastened to its outer end and a bolt welded to the other end. On the handle is welded a clip through which the bolt on the hook passes; a nut on the bolt provides for adjustment. The handle gives the worker a good grip on the jig.

When the angle iron is in position on the sheet steel, the clamp is tightened until the rivet, sheet and angle are pressed together tightly. A few blows of the hammer form the head quickly, because the backing-up block is heavy enough to absorb the shock.

Hand methods require a helper to hold the backing-up block, angle, sheet and rivet in position. This clamp enables one man to perform the operation in less time. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

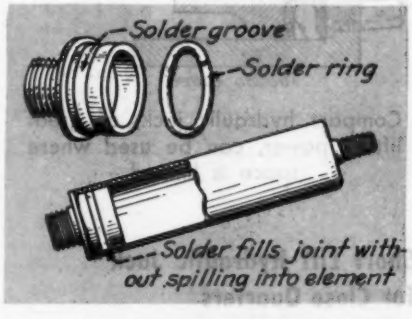
End Bushings Soldered Into Drawn Steel Shells

BY WILLIAM W. GAFFNEY
Radio Corporation of America

The tuned element assembly has a silver-plated drawn-steel shell plugged at one end with a soldered bushing. This bushing fits into the shell, its shoulder has the same outside diameter as the shell, and the portion fitting inside the shell is 0.008 in. less than the inside diameter of the shell. Thus, room is provided for the solder to flow and form a tight joint.

Previous practice was to slip a ring of rosin-core solder over the bushing and against the flange. The assembly was then heated in a radio frequency unit with the thought that the solder would flow into the 0.008 in. space between the two parts and permanently join them.

If one of these joints in a unit is not soldered together tightly, or if there is a loose solder "bead" in one of the elements, the equipment cannot be tuned satisfactorily.



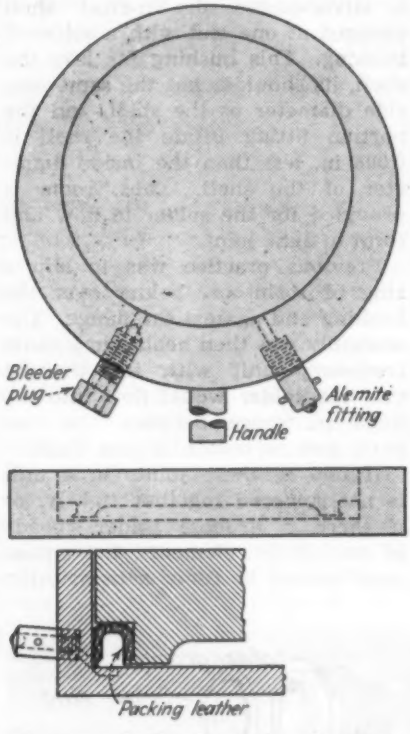
A solder groove in the end bushing of a tuning element turned defeat into success by preventing fluid solder or drops from entering the interior of the shell

It is then necessary to disassemble the unit and test each individual element until the offender is found.

To overcome this difficulty, a groove was turned into the bushing to hold the ring of solder just like a piston ring in an engine. When the assembly was heated, the solder would be retained in the joint and would not flow down the shell walls. Also the bushing would be in position before soldering, so the heating time would be shortened. With the application of less heat, there would be little danger of solder running out of the joint.

The groove proved to be true to expectations, poor joints and

beads practically disappeared. The result, a saving of 84,000 man-hours. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Compact hydraulic jack, of great lifting power, can be used where space is limited

Short Lift Hydraulic Jack for Close Quarters

BY A. W. AND W. A. BEECHER
California Shipbuilding Corporation

Where space is limited and heavy loads must be moved into position, screw jacks are cumbersome, long threaded bolts not at all convenient and customary hydraulic jacks cannot be used because of their size.

To get into cramped quarters, a very short hydraulic jack was assembled which had an overall height of less than an inch, but its lifting capacity was 15 tons.

With a body and piston turned from steel bars, sealing between the piston and cylinder wall was obtained by using a molded leather C-ring. The inlet, and check, valve was an Alemite fitting and a bolt or setscrew was the outlet or bleeder. Because of the construction, thick oil was the hydraulic fluid pumped into the jack. For convenience of movement, a long handle was welded to the side of the cylinder.

With the use of this compact jack, heavy machinery could be lifted into position with very little effort, using fewer workers. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

★

War - Winning Suggestions

appearing on these pages were selected from those recognized as meritorious by the Board for Individual Awards, War Production Drive and the Navy Board of Awards to Civil Employees. They are freely offered to industry as an aid to war production.

★

Helical Pipe Coils Wound on Mandrel While Heated

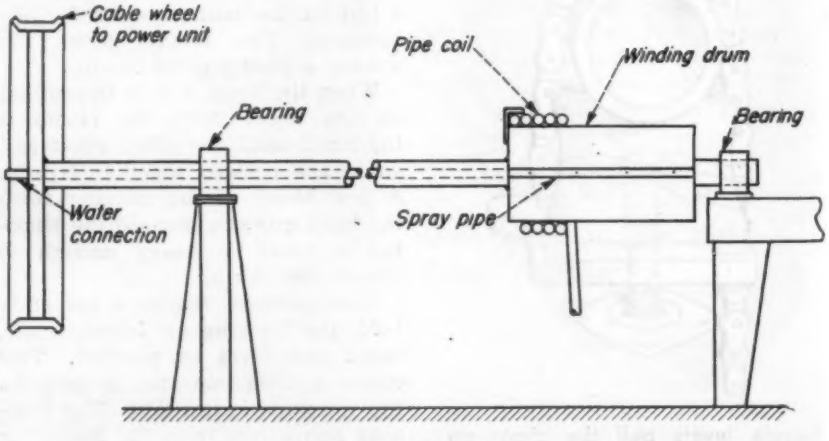
BY F. C. KYTE
Gulf Shipyard Corporation, Chickasaw, Ala.

Helical heating coils are used for increasing the temperature of water, oil and other liquids. This requires tight joints and no breaks along longitudinal seams. Where fairly large sizes of pipe, ¾ in. and over, are to be coiled, it is best to heat the pipe to redness by the use of a torch. This reduces the amount of turning effort to bend the pipe to shape and limits the possibility of splitting or flattening, because the metal is soft and more ductile.

A drum or mandrel, whose outside diameter is equal to a little less than the inside diameter of the helical coil, is internally cooled by water. The shell of this drum must be substantial enough to resist the pipe bending stresses. One head of this mandrel carries a large journal supported by a bearing mounted on a stand; the other end has a hollow shaft supported by an outboard bearing and on this shaft is a large sheave or pulley connected to a power source. A cooling water pipe passes through this hollow shaft.

To form a coil, the free end of the pipe is hooked under a clip welded to the head of the drum and the pipe is heated progressively as it is wound on the mandrel. Power is applied to the large sheave or wheel for turning the drum and bending the pipe. For closed coils, the pipe is fed tight to the coils on the mandrel; for open coils, just feed it at a uniform distance away from the preceding coil, same as you would if you were cutting a thread on a bar of steel. A little skill can be developed to maintain a constant pitch and turn out a fine looking piece of work.

With this outfit, uniform coils can be turned out almost as quickly as a man can move the pipe up to and hook it into position. Even when the number of coils is limited, the savings in cost by the use of this machine are substantial. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



A drum forms a good means for forming pipe coils of uniform pitch. Power applied through a sheave or pulley makes the work rapid and economical

Swiss Pattern Files—I

SIMPLIFIED PRACTICE RECOMMENDATION R206-44

General Information

In the case of tapered files, the widths and thicknesses given are those of the largest section.

Length is the distance between the shoulder and the point. The shoulder is the place where the body ends and the tang begins. In the case of files which have no tang, the overall length is given.

Designations for cuts, such as numbers 00, 0, 1, 2, 3, 4, and 6, are indexes of the relative number of teeth per unit of length. (There is no No. 5 cut.) In files of a given length, No. 00 cut is the coarsest and has the fewest teeth per unit of length; No. 6 cut is the finest and has the most teeth per unit of length.

A single-cut file has one set of parallel cuts; a double-cut file has two sets of parallel cuts, one set of which crosses the other.

The sizes and cuts recommended for stock production are indicated by "X" in the following table. Where dimensions for width, thickness, or diameter are not given, these dimensions are to be in accordance with each manufacturer's regular practice. All dimensions are given in inches.

Description of Types

Barrette—Triangle section with one face wider than the other two. Double cut on wide flat side and safe (uncut) on both narrow sides. Tapered in both width and thickness.

Bench—Rectangular section, safe (uncut) edges. No tang. Parallel throughout.

Broach—Round section in wire gages. Parallel throughout. Sizes are over-all.

Checkering—Rectangular section, double cut on both sides, cuts at right angles to each other. Edges safe. Parallel in width and thickness.

Coil—Thin rectangular section. Handle end in lieu of tang. Parallel throughout.

Corrugating—Rectangular section, width parallel, thickness tapered.

Crochet—Rectangular section with rounded edges. Width and thickness tapered.

Crossing—Oval section, one side same radius as half-round files, the other curved to larger radius. Double cut on both sides. Width and thickness tapered.

Die-sinkers—Various cross-sectional shapes similar to other larger files, such as knife, half-round, square. Width and thickness tapered.

Die-sinkers' riffflers—Various small cross-sectional shapes. Teeth cut on small area of each end with long middle portion for hand hold. The cut ends are of various design. Sizes are over-all.

Equaling—Thin rectangular section, parallel in width and thickness.

Fork—Rectangular section with rounded edges, width and thickness parallel. Double cut on sides and edges.

Half-round—One side flat, the other side half-round. Width and thickness tapered.

HAND

Size			Cuts						
Length	Width	Thickness	00	0	1	2	3	4	6
3	7/16	3/32	X	X	X	X	X	X	--
4	17/32	1/8	X	X	X	X	X	X	--
6	3/4	5/32	X	X	X	X	X	X	X
8	29/32	3/16	X	X	X	X	X	X	X
10	1 3/32	7/32	X	X	X	X	X	X	--
12	1 1/4	9/32	X	X	X	X	--	X	--

PILLAR

3	1 9/64	3/32	X	X	X	X	X	X	--
4	2 3/64	7/64	X	X	X	X	X	X	X
6	3 1/64	1/32	X	X	X	X	X	X	--
8	3 29/64	7/32	X	X	X	X	X	X	--
10	4 7/64	1 3/64	X	X	X	X	--	X	--
12	5 5/64	1 7/64	X	X	X	X	--	X	--

NARROW PILLAR

3	7/32	3/64	X	X	X	X	X	X	X
4	1 7/64	7/64	X	X	X	X	X	X	X
6	2 3/64	5/32	X	X	X	X	X	X	X
8	1 3/32	3/16	X	X	X	X	X	X	--
10	9/16	1/4	X	X	X	X	--	X	--
12	4 1/64	5/16	X	X	X	X	--	X	--

EXTRA NARROW PILLAR

3	3/64	3/32	X	X	X	X	X	X	X
4	3/16	7/64	X	X	X	X	X	X	X
6	1/4	9/32	X	X	X	X	X	X	X
8	5/16	3/16	X	X	X	X	X	X	--
10	3/8	7/32	X	X	X	X	--	X	--
12	7/16	1/4	X	X	X	X	--	X	--

KNIFE

3	3/8	3/64	X	X	--	X	--	X	--
4	1 5/32	7/64	X	X	X	X	X	X	--
5	9/16	9/64	X	X	--	X	--	X	--
6	1 1/16	5/32	X	X	X	X	X	X	--
8	7/8	3/16	X	X	X	X	X	X	--

PILLAR TESTING

Length	Cuts	
	0	1
6	X	X
8	X	X

SQUARE

Size		Cuts					
Length	Width of side	00	0	1	2	3	4
3	5/64	X	X	X	X	X	X
4	1/8	X	X	X	X	X	X
6	3/16	X	X	X	X	X	X
8	1/4	X	X	X	X	X	X
10	11/32	X	X	X	X	--	X
12	3/8	X	X	X	X	--	X

TAPER ROUND

Size		Cuts						
Length	Diameter	00	0	1	2	3	4	6
3	5/64	X	X	X	X	X	X	X
4	1/8	X	X	X	X	X	X	X
5	5/32	X	X	X	X	X	X	X
6	3/16	X	X	X	X	X	X	X
8	1/4	X	X	X	X	X	X	--
10	21/64	X	X	X	X	--	X	--
12	27/64	X	X	X	X	--	X	--

PARALLEL ROUND

4	1/8	X	X	--	X	--	X	--
5	5/32	X	X	--	X	--	X	--
6	3/16	X	X	--	X	--	X	--
8	1/4	X	X	--	X	--	X	--

THREE-SQUARE

Size		Cuts					
Length	Width of side	00	0	1	2	3	4
3	5/32	X	X	X	X	X	X
4	1/4	X	X	X	X	X	X
5	5/16	X	X	X	X	--	X
6	3/8	X	X	X	X	X	X
8	1/2	X	X	X	X	X	X
10	5/8	X	X	X	X	--	X

METAL SAW

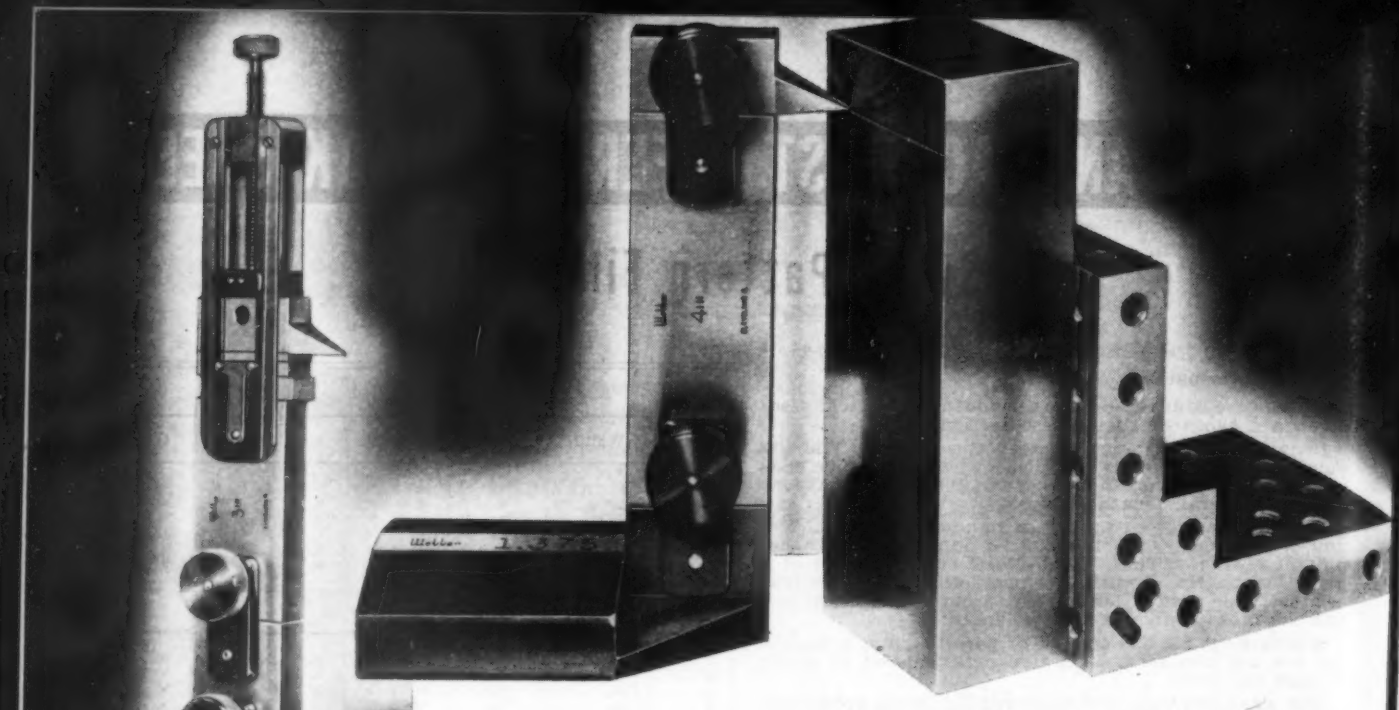
3	5/32	--	X	--	X	--	X
4	1/4	--	X	--	X	--	X
5	5/16	--	X	--	X	--	X
6	3/8	--	X	--	X	--	X
8	1/2	--	X	--	X	--	X

HALF-ROUND

Length	Cuts						
	00	0	1	2	3	4	6
3	X	X	X	X	X	X	--
4	X	X	X	X	X	X	--
5	X	X	X	X	X	X	--
6	X	X	X	X	X	X	X
8	X	X	X	X	X	X	--
10	X	X	X	X	X	X	--
12	X	X	X	X	--	X	--

HALF-ROUND RING

6	X	X	X	X	--	X	--
7	X	X	X	X	--	X	--



THE GAGE BLOCKS OF TODAY

for the Precision Measurements of Tomorrow

● The Webber Heavy Duty Gage Block Set gives the shop a more useful tool for the layout and inspection of all precision shop work.

Probably no tool is of greater use than a height gage. This is generally of the scale and vernier type, and due to difficulty of setting, is limited to accuracies from .0005 to .001 inch.

Illustrated are two precision height gages made up from the Webber Heavy Duty Gage Set. The assembly of either of these takes less time than setting a Vernier Height Gage and assures accuracy of setting in millionths of an inch and heights up to capacity of the set. Additional 6 inch blocks may be furnished when necessary.

Note the simplicity of this set—no loose pins or screws to assemble—blocks are firmly and accurately joined with Webber Eccentric Clamps. For clamping blocks of less than 1.000" onto jaws or gages, to obtain a desired dimension, the Quick Acting Clamp is used.

Here is a sturdy gage block set. The blocks are of generous proportions, the gaging surface being 11/32" x 1½", giving greater resistance to wear and infinitely longer gage life.

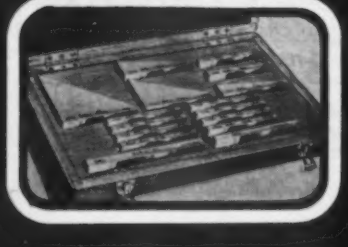
Now you can bring the accuracy of the tool room to the shop—easily—quickly—and at reasonable cost. Webber offers the gage blocks of today for the precision measurements of tomorrow.

Prices

Webber Heavy Duty Gage Sets are furnished as follows —

No. 24 Range from .300" to 24.000" in steps of .0001" — Price $385.00

No. 36 Range from .300" to 36.000" in steps of .0001" — Price $450.00



Webber
GAGE COMPANY

12901 TRISKETT RD. • CLEVELAND 11, OHIO

Swiss Pattern Files — II

Half-round ring—One side flat, the other side half round. Width and thickness tapered. Narrower than regular half-round in comparable size.

Hand—Both sides flat. Width and thickness tapered.

Joint, round edge—Rectangular section with rounded edges double cut on both edges only, and safe (uncut) on two flat sides. Width and thickness parallel.

Joint, square edge—Rectangular section, double cut on edges only. Sides are safe (uncut).

Knife—Knife-shaped section (thicker at one edge than at the other), width and thickness tapered.

Machine, parallel and bench—Various cross-sectional shapes for use in filing machines.

Machine, special parallel—Various cross-sectional shapes.

Metal saw—Equilaterally triangular. Parallel throughout.

Needle, curved blade, round-handled—Curved cutting blade. Various small cross-sectional shapes, with long round handle. Sizes are over-all.

Needle, square-handled, or escapement—Various small cross-sectional shapes. Short straight cutting blade with long square handle. Sizes are over-all.

Needle, straight blade, round-handled—Similar to escapement but with round handle and longer cutting blade.

Parallel round—Round section, parallel throughout.

Pillar—Width uniform, thickness tapered. In general the thickness is greater relative to the width than in other types.

Pillar, narrow, and Pillar, extra narrow—See Pillar.

Pillar, testing—Similar to regular pillar files but have specially shaped teeth and special treatment for testing only. Not for removing stock.

Pippin—Knife-shaped with rounded back. Width and thickness tapered.

Pivot, right and left—Rhomboid section, with opposite sides and edges parallel and equal. Width and thickness parallel. Right-hand file has acute angle between lower face and right edge when in filing position. Left-hand file is reverse.

Screw head, tanged and plain—Thin rectangular section with short bevels to form sharp edges. Cut on beveled edges; safe (uncut) on flat sides. Parallel in width and thickness.

Silversmiths' rifflers—Larger cross-section die-sinkers' rifflers.

Slitting—Flat diamond section double cut on all four sides. Parallel in width and thickness.

Square—Square in section, tapered on all sides.

Taper round—Round in section.

Three-square—Equilaterally triangular in section, tapered on all sides. Double cut, with sharp corners.

Warding—Rectangular section, width tapered, thickness uniform or slightly tapered.

CROSSING

Length	Cuts						
	00	0	1	2	3	4	6
3	×	×	×	×	×	×	×
4	×	×	×	×	×	×	×
6	×	×	×	×	×	×	×
8	×	×	×	×	×	×	—
10	×	×	×	×	×	×	—
WARDING							
3	×	×	×	×	—	×	—
4	×	×	×	×	—	×	—
6	×	×	×	×	—	×	—
8	×	×	×	×	—	×	—
10	×	×	×	×	—	×	—
EQUALING							
3	×	×	×	×	—	×	—
4	×	×	×	×	—	×	—
6	×	×	×	×	—	×	—
8	×	×	×	×	—	×	—
CROCHET							
3	×	×	×	×	—	×	—
4	×	×	×	×	—	×	—
6	×	×	×	×	—	×	—
8	×	×	×	×	—	×	—
10	×	×	×	×	—	×	—

BARRETTE

Length	Cuts						
	00	0	1	2	3	4	6
3	×	×	×	×	—	×	—
4	×	×	×	×	—	×	—
6	×	×	×	×	—	×	—
8	×	×	×	×	—	×	—
PIPPIN							
4	×	×	×	×	—	—	—
6	×	×	×	×	—	—	—
8	×	×	×	×	—	—	—
CHECKERING							
6	×	×	×	×	—	—	—
8	×	×	×	×	—	—	—
SLITTING							
4	×	×	—	×	—	—	—
6	×	×	—	×	—	—	—
SQUARE EDGE JOINT							
4	—	×	—	×	—	—	—
6	—	×	—	×	—	—	—
FORK							
6	—	×	—	×	—	—	—
ROUND EDGE JOINT							
4	—	×	—	×	—	—	—
6	—	×	—	×	—	—	—
CORRUGATING							
6	—	×	—	×	—	×	—
DIE SINKERS (12 shapes)							
3½	—	×	×	×	—	—	—
ESCAPEMENT, OR SQUARE-HANDLED NEEDLE (12 shapes)							
5½	—	×	—	×	—	×	×
STRAIGHT BLADE, ROUND-HANDLED NEEDLE (12 shapes)							
4	—	×	—	×	—	×	×
5½	—	×	—	×	—	×	×
6¼	—	×	—	×	—	×	×

CURVED BLADE, ROUND-HANDLED NEEDLE (12 shapes)

Length	Cuts						
	00	0	1	2	3	4	6
4	—	×	—	×	—	×	×
5½	—	×	—	×	—	×	×
6¼	—	×	—	×	—	×	×
DIE SINKERS RIFFLERS (18 shapes)							
6½	—	×	—	×	—	×	—
SILVERSMITHS RIFFLERS (12 shapes)							
7 to 8	—	×	—	×	—	—	—
PARALLEL AND BENCH MACHINE (12 shapes)							
As required	×	×	—	×	—	—	—
SPECIAL PARALLEL MACHINE—TENSION AND COMPRESSION TYPES (10 shapes)							
As required	—	—	×	—	×	—	—

BENCH	
10	One side cut No. 1; other side cut No. 3.
12	Do.
SCREW HEAD, TANGED AND PLAIN	
3	Cuts in accordance with manufacturer's standard practice.
COIL	
3½ to 5½, over-all.	Cuts in accordance with manufacturer's standard practice.
PIVOT, RIGHT AND LEFT	
3	Cuts in accordance with manufacturer's standard practice.
BROACH[1]	
3	Cuts in accordance with manufacturer's standard practice.

[1] Steel wire gages 40 to 65, inclusive.

ACKNOWLEDGED BY INDUSTRY AS THE LEADER IN

★ ★ ★ *Cutting Tool Performance*—

AMPCO TWIST DRILL COMPANY

FACTORY AND MAIN OFFICE
Jackson, Michigan

CHICAGO ☆ DETROIT ☆ PHILADELPHIA

Gaging Business

Rails Enter Market

The railroads are reported to be looming as potentially large buyers of machine tools. The war had depleted the number of tools owned by the industry, some of which were taken away to be put in other plants for war work, while obsolescence of the badly pressed remaining equipment engaged in maintenance work has taken its toll. But in addition, it is known that the railroads would like to do maintenance work on their Diesel engines, which until now they have had to send back to the original builders for repairs.

These factors add up to thousands of tools that may be needed by the railroads, running into the millions in value. Moreover, the urgency of this need is now greater than ever, as the railroads strain to meet the demands upon them for the deployment of men and materials across the continent for the Pacific War. Because of this last factor, the War Production Board is said to be considering the granting of a favorable rating for railroad tool orders to assure their receiving favorable delivery. Unless such a rating is received, the rails would be unable to get the needed tools in time.

Tool Industry Still Pressed

The need for a rating for railroad tool orders is evidenced by the fact that tool builders had a seven-month backlog at the end of May, and were still unable to lift shipments above the $40,000,000 mark, below which they have been for about a year. On its books, the industry still has some $90,000,000 in high-rated military orders, about $50,000,000 in foreign orders rated AA-3, and about $45,000,000 in reconversion tool orders rated AA-3. The balance of the industry's business, or about $95,000,000, consists of unrated orders.

Instead of the expected cancellation of some $63,000,000 in Russian lend-lease orders, which had been on tool builders' books at the end of May, recent developments leave this volume of business virtually unchanged dollarwise. After the initial announcement of the cancellation of lend-lease to Russia, the government tried to divert some of the cancelled tools to the auto industry, to France and Belgium. As this was being done, it became known that the continuation of shipments to Siberia under lend-lease would still justify the shipment of about one-third of the unfilled Soviet tool orders.

Foreign Business Aspects

On the heels of this, it was discovered that France was prepared to take about $25,000,000 of the Russian orders, while Belgium had taken $620,000 and might eventually take $1,500,000 of tools originally intended for Russia. These tools were in various stages of production, all the way from partly built items to crated tools in warehouses. The Belgians were reported to have balked at paying for Russian tooling on some 37 tools crated and in warehouses, since they could not use the tooling, despite their need for the tools. The tooling represented about 20 percent of the value involved.

On top of all this, it was disclosed that India has entered the tool market, and has been given a AA-3 rating, the same as that enjoyed by France and Belgium. All in all, this left the basic volume of the industry little changed from where it was before Russian lend-lease was cut.

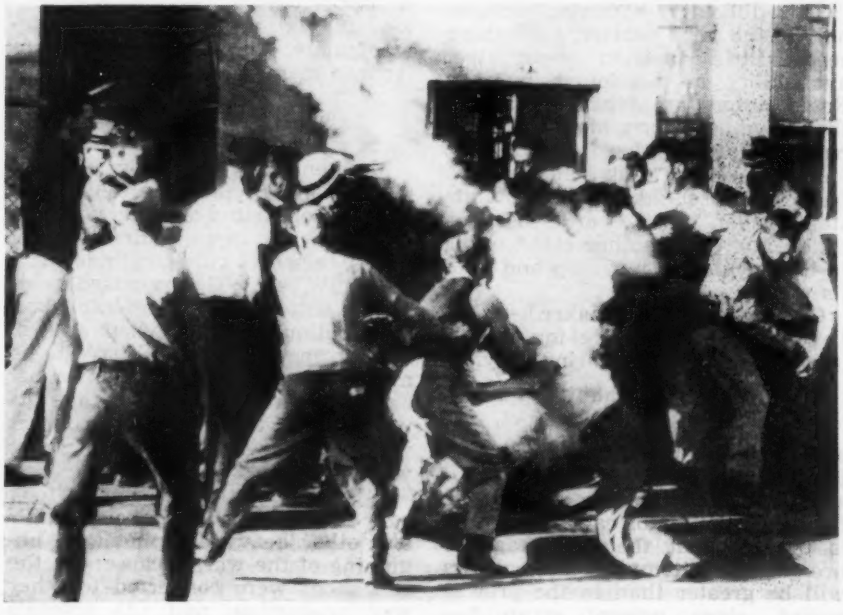
Sheet Steel Crisis

The development of the long-predicted tightness in flat-rolled steel for reconversion uses has been borne out by several War Production Board actions: (1) WPB has cut permissive inventory for sheet and strip steel to 45 days' supply from its former level of 60 days' supply; (2) WPB has indicated that its compliance division will check inventories and make sure that industry is not securing flat-rolled steel originally ordered with military ratings, since cancelled; and (3) WPB ordered steel mills on July 5th to stop taking orders for the third quarter on five types of flat-rolled steel.

These actions are believed to presage the development of a WPB program to distribute equitably available flat-rolled steel by diverting surplus inventories, by properly transferring open mill space resulting from military cut-backs, to aid reconverting industries.

Strikes Against Reconversion

Strikes in reconverting industries, a major headache right now, will prolong industry's job of getting back on the production track for full-speed output. This means that some workers will go jobless longer, depending upon the duration of the strikes in various industries. While some companies here and there may reconvert swiftly due to freedom from labor strife, strikes in certain key component or supply item industries, such as steel or bearings, might have far-reaching ramifications upon the entire economy. That is why little is to be gained in measuring the percentage of workers engaged in strikes against total employment, as a means of trying to gage the effect of strikes.



Reconversion Striking—This scene of a battle on the picket line at the entrance to the Indiana Brass Company plant at Elkhart, Indiana, is typical of the labor-management struggle that is now being reflected in strikes throughout the country, as industry tries to reconvert, while labor tries to expand its wartime gains

Third Quarter Sheet Steel Situation May Bring Directives Back

Some steel producers cannot supply sheet to auto industry, due to heavy backlog of rated orders for other types of steel, and they are hoping for WPB directives to aid them.

PITTSBURGH—The current steel situation indicates that the WPB may return to the directive system. The reason is that the auto industry is still getting only a trickle of steel, and its supply will not be materially increased until the fourth quarter under the present set-up. That is why some quarters have suggested that WPB return to the directive system with the frank intention of aiding the auto makers. But such an action seems unlikely in view of the WPB's attitude that the auto trade must shift for itself in respect to steel supply.

One of the difficulties in the steel situation—particularly in sheets—is that one or two steel companies cannot supply any sheets in the third quarter because of the extent of their rated orders, while other companies can, which means that those who cannot are worried over the advantages which will accrue to their competitors. Accordingly, the steel firms which are in a tight spot are anxious to see their competitors awarded more rated tonnage, or have the WPB take them off the spot by permitting some automobile requirements to be put ahead of some military business. That is how the idea for the return of the directive system seems to have developed.

Cancellations To Increase

This difficulty, however, pertains only to the third quarter, since there seems little question about steel availability in the fourth quarter. Rated orders are tapering, just as they have been for a month, but the pace of cancellations is not fast enough. Wiping out some of the backlog is essential. As matters now stand, when a rated order is cancelled, there is another rated order in the backlog to move up and take its place.

One important steelmaker here believes that the pressure for cancellations will increase during July.

Sheet Workability

Some interests in the steel trade appear to be mainly interested in learning about the workability of some of flat-rolled steel to be furnished the motor car industry. It is thought that the percentage of breakage in attempting deep draws will be greater than in the prewar period, since present scrap has tended to become differently alloyed during the war period. One company contemplates—when it can get into real production for the auto makers—to use only synthetic scrap in its heats destined for sheet.

In the meantime, the preferential position given the auto industry in respect to preparations for making cars is reflected in some substantial business in structural steel for new plants. There have been several large awards for new facilities.

Other Steel Pressures

There are many drains on the available steel supply from rated business in other steel divisions, and the product mix plus manpower still do not permit the flat-rolled departments to operate at capacity. These departments are still in process of building up their labor forces and full efficiency is one matter for the future. Meanwhile, heavy holdovers and new rated business in sheets run largely for containers. Plates, once the tightest item in the steel list, are now available in sheared form for third quarter delivery against unrated orders.

The overall trend in ingot production is still downward and no substantial upsurge is to be expected. July will witness slowdowns, or shutdowns for vacations and a lesser pace of production to permit long-deferred maintenance to be done.

Rails Seeking New Tools to Replace Old Items, to Increase Repair Work

WASHINGTON — War Production Board records indicate that the railroads are increasing their efforts to obtain machine tools for maintenance of their hard-beaten war service equipment, and to begin rehabilitation for peace. Most of their old engines and cars will have to stay in operation for months and even years after V-J day.

In railroad operations there is a fine line between maintenance and manufacturing. The operators build many car and engine components for maintenance, identical with those produced by the original manufacturer. From the point of view of transportation officials in Washington, the railroads seem inclined toward more, rather than less, maintenance manufacturing.

Special Tools Needed

Maintenance yards use a great many standard machine tools, such as tool room lathes and turret lathes, but they also require drive wheel lathes, carwheel lathes, cylinder boring mills, etc. The standard tools can be obtained from Defense Plant Corporation surplus, when and if, but the special tools will have to be made on order. They are scarce because they are special. But the railroads expect that pre-war producers will be able to build the types wanted rather soon.

It is true that the government took over some railroad shop boring mills and other heavy equipment, at beginning of the war, because: (1) the rail shops were converted to other war production, and (2) arsenals and other tank producers needed them (the borers were used to turn out turrets and other heavy work). So far as can be learned, this equipment was worn out or is not considered worth carting back.

Repair Work Growing

Anyway, the rail shops are reported wanting new, high-speed machines to true up tires and make new ones, and to produce many fittings needed for repair of engines and cars.

Lines owning Diesel engines, in some cases, have had to send them back to the manufacturers for overhaul, whereas they would prefer to do the work in their own shops, with a saving of time and cost. New tools will be needed for Diesel repairs, including some new types of tools.

WPB Rating Likely

The railroads of course have been regarded as war essential from the start, but now, with the shift to the Pacific, they have a harder job than ever, and their equipment is going on four years older than it was on Pearl Harbor Sunday. Spokesmen for the Machine Tools Division of WPB say they will recommend every consideration in preference ratings on railroad maintenance requirements.

World Engineering Convention

PARIS—Plans for an international federation of engineering societies (AM, 3/15/45, p144b) were further advanced at the June 17-19 meeting here of prominent engineers from 15 Allied and neutral nations. A London convention for November was arranged to discuss final organization and proposed operation of the international federation. Invitations will be extended to engineering societies around the world.

The Federation may hold a Congress in Paris in June, 1946, featured by lectures by eminent world engineers, to promote international cooperation in solving engineering problems.

Detroit Letter

Ford Leads Way

As predicted here several times, the Ford Motor Car Co. was the first of the automobile manufacturers with an assembly line in operation. The line began rolling officially just two days after the War Production Board's July 1 deadline was passed. Unofficially but actually, the first car came off the line at 1 p.m. July 2.

Meanwhile, nothing was heard from General Motors or Chrysler on their plans to start production lines moving. There was activity at the plants and the hustle and bustle that precedes setting up assembly lines but no official of either company would make a prediction when cars will come off.

Few Tires Handy

The first 1946 Ford came off the line with big fanfare. It was a light grey Ford coach, fully equipped except for the spare tire.

Strangely enough, the first car was equipped with tires marked "Ford." The company's tire plant has not been operating since the war started, having been dismantled and sent to Russia.

Frank Watza, in charge of the assembly line, explained that when the car was completed, the company had not yet received any shipments of new tires. Looking about its stockpile, company officials came across 40 or 50 "seconds" from its former tire line and rushed them into the breech for the first cars.

The night before newspapermen arrived at the plant to see the ceremonies attending the production of the first passenger car since Feb. 7, 1942, a shipment of Firestones came in, a mere five sets, and these were used on the rest of the morning's production.

Ford Materials

Practically all the new improvements in the 1946 Fords are the result of war experience. Last year thousands of 6 and 8 cylinder engines like those in the new Fords were turned out for the military.

Synthetic rubber is used everywhere in the new car except on the brake cylinder cups, where natural rubber gives best results. Synthetic tires, fan belts, engine and body supports are all giving longer service than natural rubber.

Entirely new distributor system with a separate coil is now standard equipment. An oil filter is on all super-deluxe models. Oil Bath Air cleaners are also standard equipment.

Lincoln type brake handles will be used on all the Ford cars. Better, more easily applied and serviced brakes were emphasized. The Ford will have a 114 "wheelbase, the Mercury 118." Only two bodies will be built at first: two-door and four-door sedans.

Interior trimming features solid color tones without imitation wood finishes on trim panels. The doors have artificial leather trimming instead of fabric. For the initial cars, prewar fabrics are available, so they will not be handicapped by textiles in first production.

Competition to Rise

Simultaneous with the start of assembly line operations, young Ford announced that the company would start on four new assembly plants as part of its $150,000,000 postwar expansion program. Present production, however, will be confined to Rouge.

Ford's initial quota this year of 39,000 cars will be divided into 1,000 Lincolns, 6,000 Mercurys and 32,000 Fords. It was noticable that no Lincoln Zephyrs were included in the plans and Jack Davis, sales manager, later confirmed this.

"There will be no more Zephyrs," he stated, "only Lincolns. We are going to manufacture Lincolns in a price class to compete with Buicks. We will also make them to compete with Cadillacs and Packards. In fact," he continued significantly, "we will be represented in every price class, from the lowest to the highest."

This was viewed as a challenge to other companies that Ford intends to go into hard competition to regain its top place in the field.

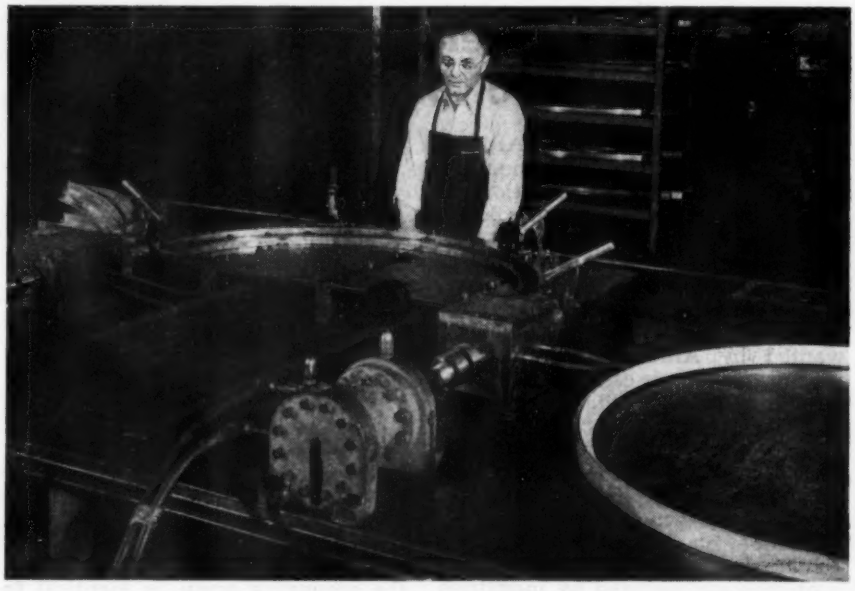
Employment Aided

Young Ford viewed the resumption of automobile production so quickly as a necessity and indicated that the company is angling for a much higher quota than has been assigned so far.

"It may seem strange to start production the second day after the green light is flashed," he said, "but our war contracts have been cut back so hard that it necessitates this action. The number of men in our plants has been seriously reduced and we had to take steps to keep as many as possible working.

"Of course, the present quota represents only two weeks ordinary production for this plant and unless it is increased we will have to lay off from 50,000 to 60,000 men."

The price of the new Ford line is still a mystery. Davis revealed that the company has asked for a "substantial" increase over the prewar price but OPA has not yet ruled on it. He said labor costs alone had gone up 25 per cent and material prices were still undetermined. He predicted OPA would probably follow the truck markup formula.



Special Stretching Machine—Built from discarded automobile body equipment, this stretching machine already has saved some $200,000 in manufacturing costs by reducing previous lengthy hand-hammering operations. Designed by Fisher Body's Detroit Aircraft Unit for use on B-29 assemblies, the machine consists of a specially-built, table-height base upon which are mounted two hydraulic jaws and a form whose contour matches the finished part. The jaws pull the part, an aluminum extrusion, against the form with a 500-1,300 lb. pressure, forcing the metal to relax into the contour of the "stretching" form

E. G. Budd Leases Government Plant to Make Streamlined Stainless Steel Cars

WASHINGTON—Largest war plant lease to date is the Government-owned Bustleton plant at Philadelphia, to the Edward G. Budd Company, which has been operating it. The transaction was made by RFC with approval of the Surplus Property Board.

Budd Manufacturing Company will transfer its railway passenger car manufacturing division to the new plant and tooling will start immediately. Manufacturing of the first streamlined stainless steel railway cars since 1941 will get under way in the fall. Meanwhile Budd will continue to carry out all its war production obligations.

For Stainless Steel Cars

The new lease, which runs for five years, provides that 77 percent of the million square feet ultimately will be used by Budd in manufacturing lightweight stainless steel railway passenger cars. A substantial portion of this is presently used in the manufacture of munitions. The company may want to utilize the remaining 23 percent on its non-war contracts; this space is presently used as a disposal center for surplus property.

The importance of stabilizing employment while plants are being re-tooled has been emphasized by RFC, which, during recent months, has permitted some plants to devote a portion of their equipment to civilian production while at the same time pushing ahead full speed with war work.

Budd produced in 4 war years $550,000,000 of munitions and other war materials for the armed forces. The new plant will go to work on a very large backlog of orders for Budd railroad streamliners. Mr. Budd said orders on hand and in prospect would keep the plant busy at top speed for years.

Excellent Facilities

The Bustleton plant comprises a main assembly and manufacturing building covering 24½ acres, administration building, power plant, with railway sidings directly into the main building. The manufacturing building has six main bays, each 1800 feet long, permitting a modern plant layout with room for assembling 80 cars in four lines at one time. Capacity is available for sub-assembly lines and parts fabrication.

Commercial electric current at 66,000 volts is stepped down at the main substation to 13,200 volts and transmitted to indoor substations where it is again stepped down to 440 volts for welding, power and lighting requirements. There are power stands in two main bays.

Army Controls German Industry; Licensing of Some Plants Started

HEADQUARTERS 15TH ARMY, GERMANY—Pending determination by the Allies of the disposition of Germany's industries, control of German production is being exercised by the various Allied occupational armies. Under SHAEF directives, German industries may only operate if: (1) their product is wanted by Allied armies; or (2) their production is essential to maintain minimum standards for the German population.

Over-all supervision has been placed in the hands of Army G-4, the general staff officer who is the commanding general's adviser and expediter on all supply matters. Under the G-4 production control, problems are assigned by industries to those special staff sections whose military duties are calculated to make them most familiar with individual industries. The ordnance section has thus taken over control of steel mills, metal refining and fabricating plants, automotive plants, tool manufacturers, and allied industries in the U. S. occupational area.

Army Surveys Plants

The ordnance section is taking a survey of 400 plants capable of making items needed by American Army Ordnance units. Typical items are paints, trucks, batteries, small machine parts, and so on. Such plants as are found capable of manufacturing items needed by the army are being put into production, the goods taken and the owners paid with an army requisition receipt. It is assumed that ultimately the manufacturers will be reimbursed by whatever national government is finally set up for Germany. This system, by which the defeated nation pays for products needed by the occupying army, is identical to that followed by the German army.

A sudden need for trucks was met by use of the Ford plant at Cologne to turn out 500, and more are now being produced. Parts producers are being licensed and labor and fuel allotted to them. Most of German manpower is being utilized by clearing war wreckage, unless it is needed for other purposes.

Research Labs May Still Get Listed in National Directory

WASHINGTON — Compilation of the 8th edition of the National Research Council directory of industrial research laboratories in the United States is now under way. The 7th edition appeared in 1940 and contained information concerning the industrial research laboratories of 2,264 companies and their subsidiaries. The data excludes laboratories concerned only with commercial testing.

The National Research Council announces that those laboratories who have not received a questionnaire for the current edition may obtain one by writing to the Library, National Research Council, 2101 Constitution Avenue, Washington, 25, D. C. There is no charge or obligation connected with the listing of the laboratory data in the directory.

Mason Britton Heads Committee to Study Nazi Tool Industry

WASHINGTON — A Technical Industrial Disarmament Committee to study the Treatment of the German Machine Tool Industry was revealed to be in existence by Leo T. Crowley, Foreign Economic Administrator, in a statement before the War Mobilization Sub-Committee of the Senate Military Affairs Committee on the subject, "Germany's Economic Base for Aggression." The Tool Committee is only one of 31 similar groups set up as "study projects" on problems assigned to them and will make its report to the Director of the Enemy Branch in an advisory way. Such reports many have an important influence on government action in connection with these German problems.

Members of the Tool Committee include as chairman Mr. Mason Britton, consultant to the FEA; George Adams, State Department economist; William L. Back, asst. chief, Machinery Unit, Department of Commerce; Lt. William Bray, economist with Office of Strategic Services, John S. Chafee, Director, WPB Tools Division; Commdr. E. A. Ewing, Chief, Navy's Tools Section; Frederick Geier, technical consultant FEA; Aldon B. Gomez, legal counsel, WPB Tools Division; Lt. Col. P. L. Houser, chief, Equipment Branch, ASF Production Division, War Department; Brig. Gen. H. F. Safford, chief, Production Service Division, Ordnance Section, War Department. Executive officer of the committee is Franz T. Stone, FEA consultant, detailed from WPB, while the executive secretary is Miss Louise Eaton, FEA analyst.

Washington Bulletin

Russian Lend-Lease

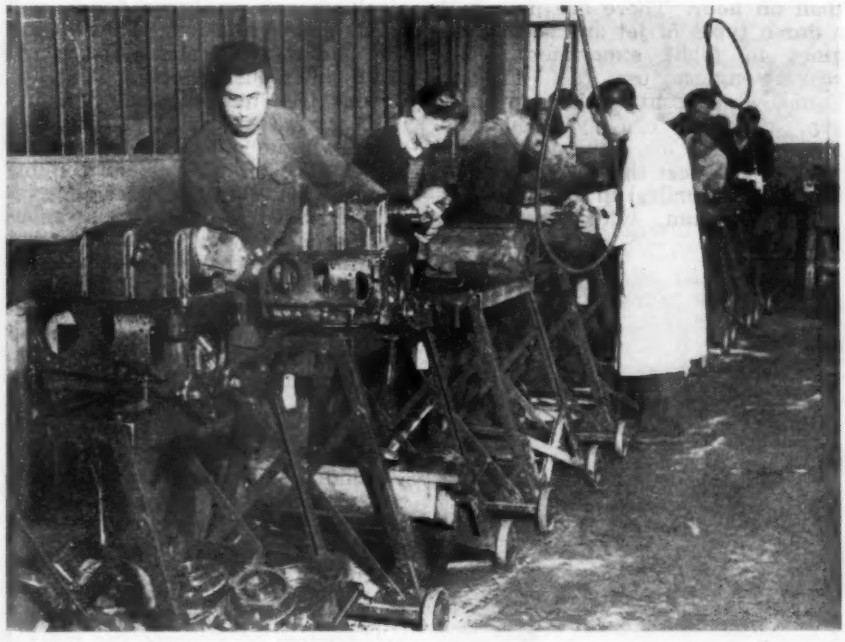
Lend-lease Administration has stopped its regular program of shipments to Russia, but there remains in effect a program sponsored by Army and Navy, which goes through Lend-lease, for aid to the Soviet Siberian armies. While this aid does not guarantee that Russia will enter the war against Japan, it does help in forcing Japan to keep armies standing against the Russian threat. Obviously, Russia could establish a reasonable claim that almost any aid would affect the Siberian defense program. It is reported that the military-sponsored Lend-lease pipeline still feeding into Russia is carrying some machine tools.

RFC Consolidations

Consolidation of its subsidiaries within the Reconstruction Finance Corporation itself, by act of Congress, at the request of new Federal Loan Administrator John W. Snyder, doesn't make much difference to the average man in business. Functions of the Rubber Reserve Company, Metals Reserve Company, Defense Plant Corporation, Defense Supplies Corporation —all created for war emergency, will be carried on as usual, and pretty much by the same officials. Snyder contended that, in the interest of economy and sound government, there was no point in continuing them as separate corporate entities. The consolidation is just a formality; what will really matter to the citizen is RFC's shift from war to peace policy on loans to business, and its participation in business.

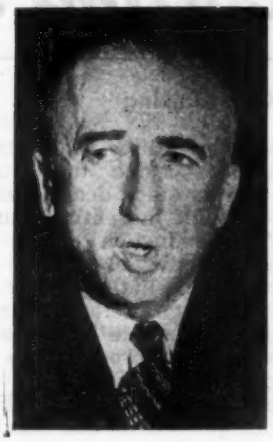
Surplus Outlets Rising

RFC announces it now has 41 surplus property sales outlets in as many U. S. cities to aid in the sale of some 3000 principal items for which the Surplus Property Board has designated RFC as the disposal agency. All RFC 31 regional offices are now authorized to sell surplus goods, and there are in addition 10 branch sales offices. There are 66 separate aircraft sales centers. The 41 disposing agencies are connected by teletype, so that inquiry at any point for an item not on hand is quickly transmitted to all others. A recent inquiry at New York for a certain type of machine tool, not available there, was relayed, and the item was found within 48 hours.



French Recondition Engines for Pacific—Some of the 7,000 French civilians working at 14 Parisian plants to help rebuild engines for redeployment to the Pacific area, are shown here working on hydramatic transmissions, which are taken apart for cleaning, repair, or replacement of damaged parts on an assembly line basis. Under the supervision of 30 Ordnance officers and 230 enlisted men, these workers have already overhauled 60,000 engines, which have been completely torn down, repaired and rebuilt to rigid specifications. The workmen are paid by the French government under reverse lend-lease

New Secretary of State



James F. Byrnes

Replacing Stettinius, Mr. Byrnes assumes an office that will probably exercise more influence over world trade than ever before

WPB Control Changes

Present controls on components entering into steel production should be maintained until rated orders drop below 85% of productive capacity, according to an opinion presented to War Production Board by the Steel Operations and Metallurgical Industry Advisory Committee. The components meant are pig iron, scrap, coke and alloying elements. It was suggested that industry should have a chance to build up inventories, within WPB limits, before removal of the controls.

The War Production Board's most recent additions to list of items which may be produced under "spot" authorization include trucks, automobiles, and radios. The spot authorization is a partial relaxation of materials and manpower restrictions, but it guarantees nothing. Manufacturers who wish to try it simply apply to local production, labor, and military officials to learn whether there is enough of those essentials over war needs to keep them going.

Jet Costs High

Lifting of the lid on enemy weapons and methods by U. S. military security has given rise to fantastic speculations concerning jet power. Sensation writers, encouraged by some persons who should know better, have pictured meteoric airplane speeds, and jet-powered ships, cars, and busses. They do not tell readers that speed requires power, and that power is limited by the price the customers will pay for speed. Automotive speeds that could use jet power at all efficiently would require redesign of the highways on which they were used. There are definite possibilities in gas turbine engines for surface transportation.

Spotting the Air News

Plane Cuts Jolting

It took nearly three years for the industry to become the world's biggest and its quick demobilization is bound to jolt the entire country. The War Production Board has amended Directive 40 so as to provide for the cancellation of war contracts, including aircraft contracts, as rapidly as possible after the fall of Japan. Aircraft production is now running at a level of about 8000 units per month, with a vast alliance of engines, propellers, and hundreds of other components from many industries. The total of aircraft war supply contracts, as of April, was about sixty billion dollars.

Directive 40 is the WPB document which promulgated the Production Readjustment Committee which is responsible for the execution of the policies of the Office of War Mobilization and Reconversion, dealing with procurement cutbacks and the utilization of plants and facilities released from war production. The amendment discontinues procedures for clearance and consultation on cutbacks, effective on V-J day, and the procurement agencies will report to the Committee those programs that are to be continued.

Tapering Would Be Better

The quick deployment of so much manpower in war industries is worrying not only employers but local governments. The aircraft industry's case is different from the others only in that it is bigger. Spokesmen for that industry feel that the Government should have a gliding plan for termination, rather than a free fall. There will be a period of unemployment and extreme difficulties between the war contract stop order and the beginning of civilian production. Production of useless aircraft and components in a taper-off period would look just as futile to them as it would to the taxpayers. One way to taper off would be to begin now. Most air officers believe the war will end with mountains of unnecessary aircraft on hand. But apparently nobody in authority has the audacity to slow down production of models in action.

Commercial Demand Tiny

Foreign Economic Administration and the State Department have surveyed the foreign market for airline type planes, and find that the present total requirement abroad is about 325 aircraft. Domestic lines recently reported they want 350 planes as soon as they can get them. Even with maximum estimated expansion of commercial aviation, domestic and foreign, within the next ten years, only a few thousand planes will be needed.

Trustworthy authorities are talking about the possibilities of mail and express transport with rockets, which can cross the Atlantic in less than an hour. There are now half a dozen types of jet and rocket engines in flight experiment. The rocket engines use fuel, dry or liquid, which contains its own oxygen, and they can fly above the main body of air. And the rocket engines can beat the cost by climbing 50 or 60 miles up and flying in a near-vacuum, with near zero-resistance.

New Curtiss Seahawk—The latest Navy warplane in combat with the U. S. Fleet, the Curtiss Seahawk (SC) can fly faster, higher, and farther, and can defend itself better than any previous Navy scout plane. The single place, single float, low-wing seaplane has a nine-cylinder Wright Cyclone engine and four-blade Curtiss electric propeller, giving it three times the horsepower of earlier scout planes

9,366 ENEMY PATENTS USED

KANSAS CITY, MO.—Of 45,000 patents and patent applications seized from enemy aliens and nationals of occupied countries, 9,366 have been licensed to 760 American firms and individuals, according to Dexter North, chief of patent administration of the Office of the Alien Property Custodian. Over $150,000,000 worth of items, mostly war goods, have been produced from them.

The announcement was made on the occasion of Mr. North's officially turning over complete working drawings on enemy patents to the Midwest Research Institute, which will be a repository for the seized patents.

Less Aviation Machining

Air forces officers who have examined what remained of the Luftwaffe, have told this writer that the Germans had flown a rocket-powered troop plane at a speed of 1200 m.p.h. Mere speed has no deleterious effect on humans; what hurts them are the forces created by too-rapid acceleration, deceleration, and deviation from course. It is not difficult to provide breathing air at normal ground pressures in passenger compartments, at any desired elevation. The supposition that airplanes, as we know them, will be outmoded for long-range operations, in war and commerce, is not at all ridiculous. Effective attack by rockets is a technological certainty if more war is permitted. The Germans, who far outdid everybody else in jet thrust, had perfected flying bombs which they were dropping into a ten-mile circle target two thousand miles away in Russia. The point of all this, for the metal-working industry, is that it portends intensive development in chemistry and metallurgy but it cuts down on mechanism and the machining of metal in the aviation power field.

Helicopter Bonanza

Hundreds of engineers and plain tinkerpots are working on rotary-winged aircraft throughout the land, hoping to make a lucky strike in air flivvers, as Henry Ford did in road bugs. They think that if they can achieve a simple flying machine, independent of airports, the market will read in millions. Latest rotorwing is a roadable helicopter, called the Flymobile, built by a man in California, portentiously named Curtis Wright, and Dr. E. W. Kay, both men of sound aeronautical experience. They expect the machine to make a road speed of 56 m.p.h. It has co-axial counter-rotating rotors, 90 horsepower, and seats two.

MAY CUTBACKS $5 BILLIONS

WASHINGTON—Reflecting VE-Day cutbacks, May contract terminations hit $5,100,000,000, up from April's $1,800,000,000, according to Robert H. Hinckley, Director of Contract Settlement. The War Department accounted for $4,600,000,000 of the May terminations.

Hinckley reported that settlements of termination claims had jumped in May to $1,700,000,000 from the 1944 third quarter rate of $800,000,000 per month. Although terminations are well below cancellations, Hinckley predicted that the August-September rate should rise above the $2,000,000,000 mark, once contractors get their claims in on contracts affected by the April and May cuts.

Manpower, Materials Hamper Canadian Reconversion Start

MONTREAL—More than 50 wartime controls have been lifted in Canada since VE-Day. The more important ones are:

(1) Permits issued for manufacture of 10,000 passenger cars.

(2) Restrictions on manufacture of bicycles, washing machines, ironers, vacuum cleaners, sewing machines, removed.

(3) Restrictions removed from production of commercial electric equipment and household appliances.

(4) Peak allowable production of new farm machinery boosted to 130 percent of 1944 production.

(5) Restrictions removed on production of construction machinery, and certain office equipment.

(6) Restrictions lifted on purchase of many wartime metals.

However, government officials warn that it may be some time before the effect is felt by the public. It may be months before production reaches sizable proportions.

One of the handicaps to immediate resumption of peacetime manufacture, apart from the fact that Canada is still geared to production for Pacific war needs, is the labor shortage. Another is the difficulty of getting raw materials.

New light on the general employment situation in Canada was shed by Selective Service Director Arch MacNamara at a recent International Labor Organization conference in Quebec City. Mr. MacNamara said that it was hoped to evolve a voluntary means of recording job changes so that the pulse of employment conditions could be watched closely.

He explained, "We had hoped to build up in our employment service something that will compare favorably with anything in the world and we think by making it efficient, employers will come to it and there will be no need for compulsion."

Names in the News

E. M. Dowd

C. A. Butcher

Edward M. Dowd, general superintendent of the Lapointe Machine Tool Co., of Hudson, Mass., has been promoted to the position of executive assistant to **John J. Prindiville, Jr.,** vice-president. Mr. Dowd was formerly superintendent in charge of engineering and manufacturing postwar products at the American Bosch Co., Springfield, Mass.

Charles A. Butcher, formerly manager of the Pacific Coast manufacturing and repair department of the Westinghouse Electric Corp., Oakland, Calif., has been appointed assistant general manager of the Crocker-Wheeler Div., Joshua Hendy Iron Works, Ampere, N. J.

A. B. Ordway, vice-president and general manager of the Kaiser Co., Inc., Iron and Steel Division, is directing the company's administrative offices at the steel plant near Fontana, Calif.

Homer B. Johnson will represent The Pipe Machinery Co., of Cleveland, Ohio, in Chicago, Ill., and retain his own offices at 549 West Washington Blvd., Chicago.

Frank M. Maly has been appointed sales manager for plastic presses of The Baldwin Locomotive Works, Philadelphia, Penn., to direct the company's activities as a supplier of postwar plastic and rubber molding machines.

Gerard F. Norton has been appointed general manager of the engineering department of Crawford, Callan & Co., New York, N. Y. Mr. Norton will handle the export of machinery and industrial equipment to all foreign markets.

C. A. Weir, formerly assistant general superintendent of the Dodge Manufacturing Co., Mishawaka, Ind., is now associated with the Marshall & Huschart Machinery Co., Chicago, Ill.

Ray Ellinwood has severed his connection as president and general manager of Adel Precision Products Corp., Burbank, Calif., and plans to establish a new organization bearing his name.

The board of directors of **General Motors Corp.,** New York, has elected **Lieut. Gen. William S. Knudsen** a member of the board, from which he resigned in 1940 after having entered the service of the government.

E. G. Bailey, a vice-president of The Babcock and Wilcox Co., New York, has been elected an honorary member of The Institution of Mechanical Engineers in England.

Dr. George E. Ziegler, physicist on the staff of the Midwest Research Institute, Kansas City, Mo., has been appointed executive scientist in charge of all project production.

N. Greenhalgh, director of Burton Griffiths & Co., Ltd., Marston Green, Birmingham, England, is in this country making the rounds of American machine tool builders that his firm represents in the United Kingdom.

W. B. Stout

G. S. Crane

William B. Stout, automotive and aviation engineer, will head automobile research and development at Graham-Paige Motors Corp., Detroit. Mr. Stout's services were obtained through agreement with Consolidated Vultee Aircraft Corp., San Diego, Calif., to which he is under a long-term contract. Designer of the first American commercial monoplane, the first Ford tri-motor planes, Mr. Stout designed his first automobile as early as 1911.

G. S. Crane, formerly vice-president in charge of sales and engineering of Cutler-Hammer, Inc., Milwaukee, Wis., has been elected president of the company.

E. J. Hergenroether, recently resigned chief of the metallurgical branch of the Steel Division of War Production Board at Washington, D. C., has resumed his duties with the development and research division of the International Nickel Co., Inc., New York. His headquarters will be in Detroit, Mich.

Roy C. McKenna has been elected president of the Vanadium-Alloys Steel Co., Latrobe, Pa., replacing **Floyd Rose,** resigned.

W. D. Kennedy

E. T. Price

William D. Kennedy, vice-president and manager of Wright Aeronautical Corporation's Cincinnati, Ohio, plant has been named vice-president and general manager of the Engine Building Corporation with headquarters at Paterson, N. J.

Edmund T. Price, president of Solar Aircraft, San Diego, Calif., will head the company's precision casting division, recently purchased from B. F. Hirsch, Inc., New York, N. Y., to be operated on an expanded scale as a subsidiary of Solar Aircraft.

Dr. William E. Wickenden, president of the Case School of Applied Science, Cleveland, Ohio, has been elected president of the American Institute of Electrical Engineers for the year beginning August 1, 1945.

Col. K. A. McLennan has been appointed vice-president of the Heaps Engineering Ltd., Canada. Col. McLennan, who has been a member of the board for a number of years, is also executive vice-president of North Vancouver Ship Repairs, Vancouver, B. C.

John T. Blossom has been appointed vice-president in connection with national sales and distribution of the Coroaire Heater Corp., Cleveland, Ohio.

Auguste G. Pratt has been elected chairman of the executive committee of the board of trustees of Stevens Institute of Technology. Mr. Pratt, president of The Babcock and Wilcox Co., New York, fills the vacancy caused by the recent death of **Robert C. Post.**

J. F. Joy has been elected vice-president in charge of engineering of The Federal Machine and Welder Co., Warren, Ohio.

William L. Davis has been appointed vice-president in charge of operations of the United States Steel Supply Co., subsidiary of U. S. Steel Corp., with headquarters in Chicago, Ill.

Lester H. Roemer has recently assumed the duties of New York district manager of The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio.

J. J. Mellon has resigned as president of the Clark Controller Co., Cleveland, Ohio, to accept an assignment of confidential work for the United States government.

A. S. Knoizen has been appointed a director of The Reliance Electric & Engineering Co., Cleveland, Ohio.

BUSINESS ITEMS

The Baldwin Locomotive Works, Philadelphia, Pa., will open a headquarters in Paris in September to serve France, her colonies, and Belgium and Holland.

An addition to the **Robert H. Clark Co.,** Beverly Hills, Calif., occupies an area of 10,000 square feet to provide facilities for increased production.

William P. Tidwell, public relations counselor, formerly director of information Surplus Property Board and Surplus War Property Administration, Washington, D. C., has established a specialized information and consultant service on surplus property at 711 Woodward Building, Washington.

The Marsh Steel Corp., North Kansas City, Mo., has been formed as a warehouse for and distributor of steel products.

Kansas Motors Co., Kansas City, Mo., is in the process of constructing the first motor unit of the new Kansas Motors Building at Ninth Street and State Avenue. It will contain a motor rebuilding shop and garage.

The Dayton Tool and Engineering Co., Dayton, Ohio, has changed its name to the **Dayton Precision Manufacturing Co.,** with its plant at 600 W. Third St.

The Ford Motor Co., Dearborn, Mich., has purchased a 100-acre tract in St. Louis, Mo., and plans construction of an assembly plant, daily capacity 500 automobiles.

Dawson Machinery Co., Seattle, Washington, has been appointed by **Keller Tool Co.,** Grand Haven, Mich., as a new distributor in that territory for Keller pneumatic tools.

The Unit Equipment Division, Schenectady, N. Y., of **General Electric Corp.'s** Central Station Divisions has been established with **M. B. Elliott,** appointed manager.

General Electric Co., Schenectady, N. Y., has selected a site at Tiffin, Ohio, and is in process of selecting another site for a new manufacturing plant, both to be operated under the management of the company's Fort Wayne works.

John A. Patton, Management Engineers, have moved to new quarters at 176 West Adams St., Chicago, Ill.

OBITUARIES

Walter B. Macaulay, who for the past 35 years had been chief engineer at the Yuba Manufacturing Co., San Francisco, died June 9 at his home in Oakland, Calif. Mr. Macaulay was known for his development of a modern placer dredge design.

Myron J. Czarniecki, 53, vice-president in charge of sales for A. M. Byers Co., Pittsburgh, Pa., died June 18 at his home near Pittsburgh.

John P. Crandall, 70, president and founder of the Crandall Can Filling Machine Co., Buffalo, N. Y., died at his home in Buffalo recently after a six months' illness. In 1910 he invented a process of filling cans with liquid which later revolutionized the industry.

Benjamin Briscoe, 78, automobile pioneer and former president of the Maxwell-Briscoe Motor Co., which later became part of the Chrysler Corp. died June 26 at his home in Dunnellon, Fla. Mr. Briscoe was a business contemporary of such automobile industrialists as David Buick, Henry Ford, John D. Maxwell, R. E. Olds, and William C. Durant.

Herbert J. Winn, 74, chairman of the board of the Taylor Instrument Co., Rochester, N. Y., and former co-owner of "The Rochester Democrat and Chronicle," died June 27 at his home in Rochester. Mr. Winn became a director and treasurer of the Taylor company in 1907, president in 1913 and chairman in 1938. Joining the company in 1893, Mr. Winn was sent to England 5 years later to open a Taylor branch.

Cutting Multiple Threads Without Changing Gears

BY A. HALCOMB

UNDER "Practical Ideas," there was an article by John M. Ganez, on "Cutting Multiple Threads With Gears Engaged." The article stated that the compound was set over 45 deg., but possibly more information would be of value to other readers.

Setting the compound at 45 deg. makes calculations easy, because the trigonometrical functions are the same for both short sides of the triangle.

Let's assume that the lead of the thread is one-fourth of an inch, and that quadruple threads are to be cut. Then the pitch, or distance between each thread, is 1/16 in., and the depth of the thread is the same as for a 16-pitch thread.

The sine and the cosine of 45 deg. are 0.7071, and the hypotenuse (long side) is 1.414 times the short side. So for a pitch of 1/16 in., the distance along the hypotenuse for the 16-pitch thread will be $0.0625 \div 0.7071$ or 0.0625×1.414, which equals 0.0837 in. This is the distance it is necessary to move the compound to place the tool into position for the next thread.

For a 16-pitch, 75 percent depth thread, the tool must enter the metal 0.03045 in., this distance is obtained by using the cross-feed dial.

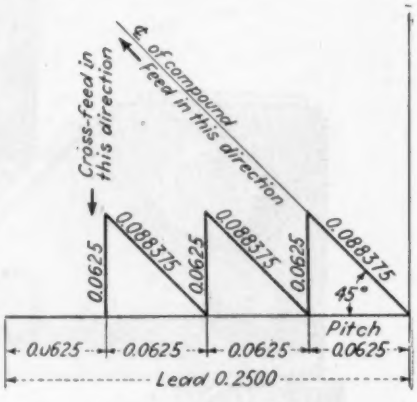
Operation is as follows: move the tool until it is in contact with the metal and note the readings of the cross-feed and compound dials. Cut the thread by using the cross-feed until a depth of 0.03045 in. has been reached, then back out.

For the second thread, move the compound 0.088375 in., use the cross-feed to feed in 0.0625 in., then cut the thread by using the cross-feed for the depth of the thread of 0.03045 in.

The third thread requires a movement of 0.088375 in. of the compound, in addition to the previous distance, while the cross-feed is moved a space of 0.0625 in. on top of the former length.

This process continues for each consecutive thread, feeding always in the same direction.

If quintuple threads had been desired in the ¼-in. space, then the pitch of the thread would be 0.050 in., the compound would move 0.07071 in., and the cross-feed would change 0.050 in. plus 0.0243 in. for 75 percent depth of a 20-pitch thread.



With the compound thrown over 45 deg., feeding 0.0884 in. outward has the same effect as moving the carriage 0.0625 in. The cross-feed is moved in 0.0625 plus the depth of the thread. This is repeated for each thread

New Low-Tension, High-Frequency Aviation Engine Ignition System

A COMPLETE new aircraft engine ignition system has been developed and will be completely produced by A. C. Spark Plug Division of General Motors Corporation. This includes a low-tension high-frequency magneto as the electrical source. Incorporated in the magneto is a distributor which directs this current to each of the spark plugs in proper sequence. The new type spark plugs used have a high tension step-up transformer in the core of the ceramic insulator. Between each distributor terminal and the spark plug is a "spark gap tube." It is claimed that the voltage impressed across the gap in the spark plug electrodes is practically without voltage loss and is approximately twenty times faster in discharge than ordinary ignition systems where ten-foot leads are often required.

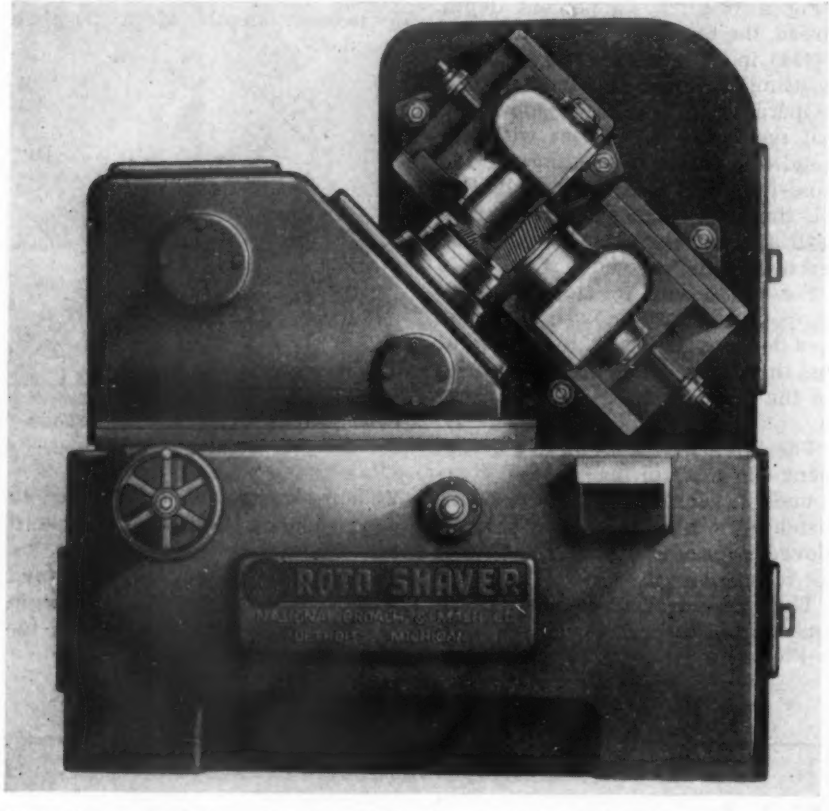
It is claimed that this new system facilitates starting in sub-zero weather, reduces aircraft engine maintenance time, and minimizes effect of oil, carbon and lead fouling of spark plugs. It also raises the ceiling of extremely high altitude flying because it does not short out in the rarified atmosphere.

Other advantages lie in its resistance to moisture troubles and lack of radio interference even with unshielded distribution wires. It has been discovered that in arctic weather engines that have stood over night often have condensate frozen between spark plug electrodes. Ordinarily, it is necessary to remove and clean these plugs before the engine can be started but with this new system it has been discovered that sufficient electrical energy is built up to fire through the ice. As Taine McDougal of A C explained, "such a steep wave front is released when the 'spark gap' tube fires that the electrical discharge is so fast and strong that it is not able to follow the fouled leakage path and therefore fires the charge despite the fouled insulator."

The availability of a complete ignition system from one manufacturer, means, as some engineers claim, better balanced engine performance, and will tend to stand up longer in service under varied operating conditions.

Shop Equipment News

Roto-Shaver Finishes Circular Parts to Close Surface Tolerance



Roto-Shaver is designed for rapid loading and unloading. The design of cutters is such that they can be sharpened on standard grinders

A Roto-Shaving machine primarily for finishing the back face and bore of automotive rear axle ring gears is manufactured by National Broach and Machine Co., 5600 St. Jean, Detroit 13, Mich. This operation replaces the green grinding of the two locating surfaces prior to the gear cutting operation.

The machine may be used with equal effectiveness to finish pressure plates, internal ring gears and other parts. Cutter heads can be made for a variety of special applications.

By way of explanation, Roto-Shaving is a rapid, close tolerance green finishing operation for circular, flanged, cylindrical and conical parts. It is especially useful in the finishing of those surfaces later to be used as locating surfaces for subsequent machining operations.

The complete cutting cycle on large truck ring gears both back face and bore is approximately 15 to 20 seconds and considerably less on passenger car gears. Approximately 3000 to 4000 parts can be Roto shaved before the cutters need regrinding, on the basis of removing up to 0.015 in. of stock from the back face and 0.020 in. from the diameter of the bore. Both back face and bore are shaved simultaneously to tolerances required for accurate gear generating.

In many cases, the machine will be fully automatic, merely requiring the operator to load and unload. One operator can handle more than one machine on a long production run.

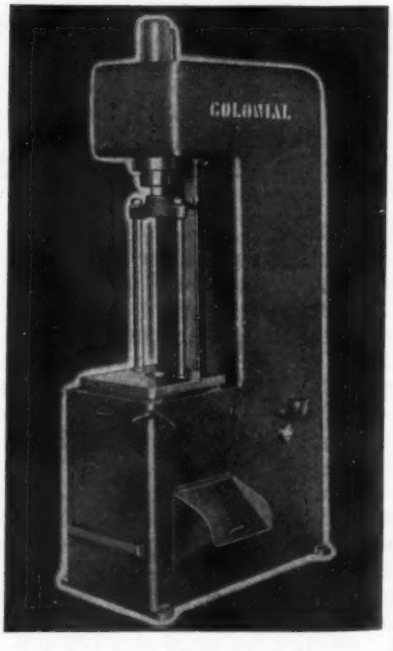
This machine will handle ring gear bores from 4¼ in. to 9 in. and gears having an O.D. up to 15⅜ in.

Hydraulic power is used to clamp the work and to traverse the work slide. Feed is controlled by cam. The work is rotated during the cutting cycle. A one-horsepower motor drives the work part and a one-horsepower motor drives each cutter. Both drives are through V-belts. Change sheaves provide speed changes.

Colonial Broaches Equipped For Push or Pull Broaching

The utility broaching presses, a product of Colonial Broach Co., Detroit 13, Mich., are manufactured with a pull-down attachment, making them suitable for pull-broaching as well as push-broaching. The increase in flexibility provided is useful where extreme broaching accuracy is required or where the broaches are too small in diameter to be pushed through the work.

The attachment has two vertical guide rods, tied together top and



Colonial broaching press acts as push or pull press without change

LODGE & SHIPLEY LATHES *at work-*

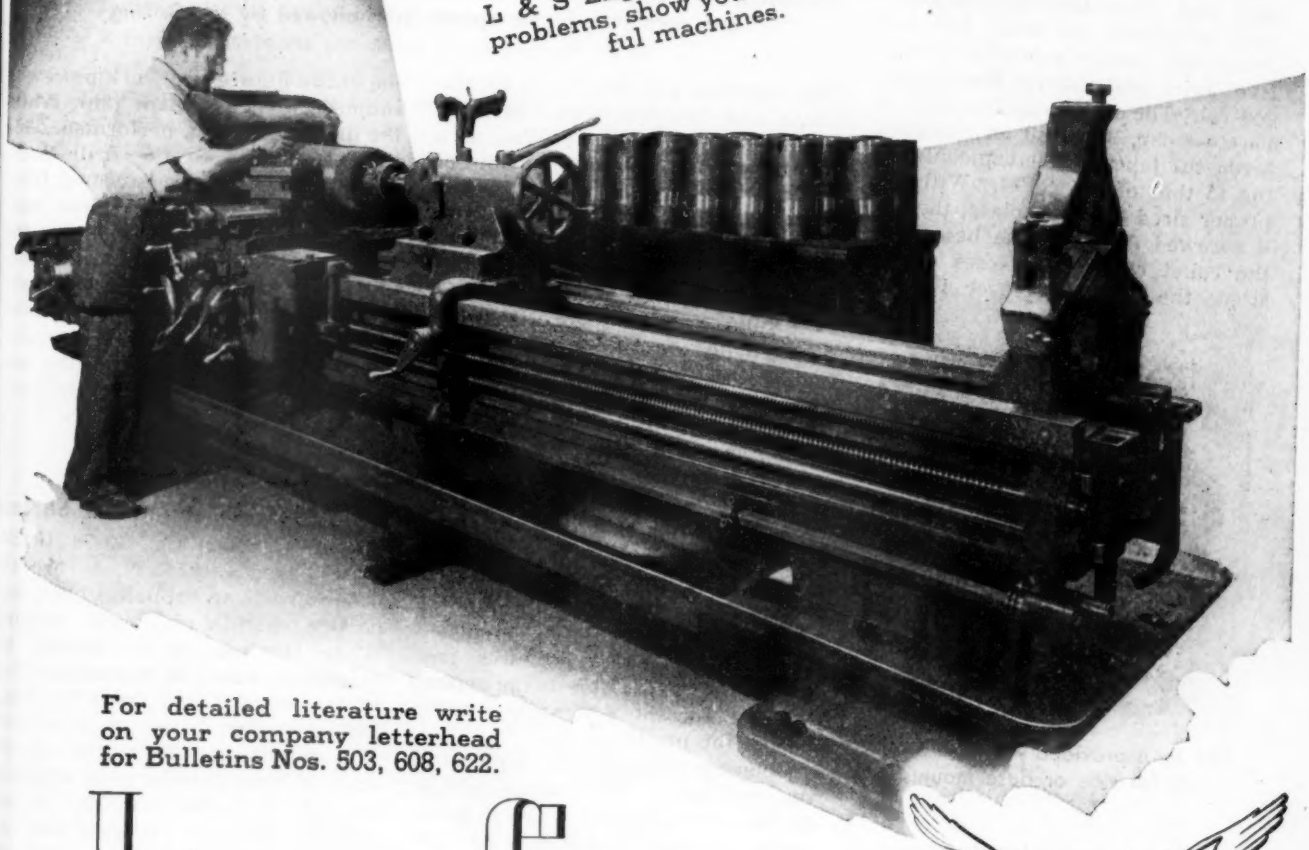
TURNING PRECISION CYLINDER SLEEVES FOR GAS AND DIESEL ENGINES

● If a ship's engines fail at sea or a locomotive breaks down on the road there's trouble to pay. Vital engine parts like cylinder liners must be accurate and rugged enough to withstand the toughest wear and tear.

Martin Machine Works, Chicago, specialize in making gas-electric and diesel cylinder liners . . . maintain high production and precision accuracy with their new L & S 22 inch Lathes.

The 18, 20 and 22 inch L & S Lathes are entirely new in design of every part, possess tremendous strength, yet assure utmost accuracy and output. The new bed, for example, has flat type bearing ways that completely prevent lift or twist of the carriage under the heaviest cuts. All controls are conveniently located for easy operation. A wider range of speeds, and instantly selected threads and feeds increase versatility of the lathe, permit full use of the cutting possibilities of all types of tools.

L & S Engineers will gladly discuss your special lathe problems, show you the advantages of these new, powerful machines.



For detailed literature write on your company letterhead for Bulletins Nos. 503, 608, 622.

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI 25, OHIO, U. S. A.

L & S LATHES

ENGINE — TOOL ROOM — AUTOMATIC — OIL COUNTRY LATHES

bottom with tie-bars. The lower tie-bar of the attachments carries a puller adaptor designed to permit the use of automatic pullers. Accurate alignment is assured through the use of hardened and ground bars for guiding the broach, the guides sliding in long bushings pressed into the platen bed.

The attachment is provided to fit all models of utility presses manufactured by Colonial.

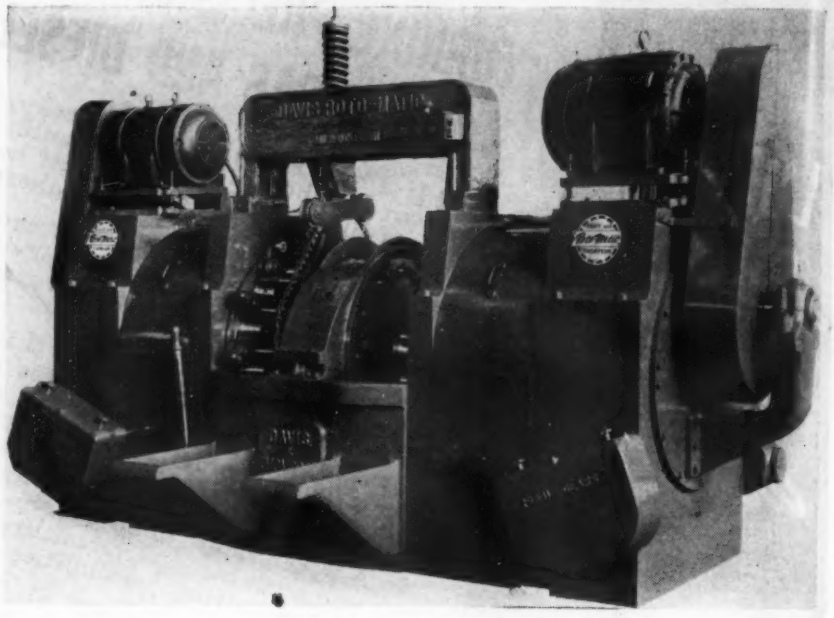
Monarch Jiffy-Jig Simplified For Vertical Holding Jobs

Monarch Governor Company, 1832 West Bethune, Detroit 6, Mich., announces a simplified model J-10A Jiffy-Jig which provides for its use in the vertical position. Except for the bracket, that allows for horizontal set-ups, this model includes all of the features of the model J-10 Jiffy-Jig and is adapted to various machine tools for drilling, milling, grinding or boring. Chucks are designed to provide ample chip clearance and, when the chuck is either open or closed, the collet has zero axial and rotary movement—positive axial and rotary dimensional control. The design consists of three parts—a cap, base and an operating lever, the taper on the cap conforming to that of the collet. With the proper sized collet in place, the cap is screwed down on the base until the collet opens and closes as desired; the operating lever is then

Jiffy-Jig is provided with cast brackets for side or base mounts

screwed into convenient location and the jig is ready to use. It has capacity for stock ranging from 1/16 to 1 in. cross section. It may also be used in conjunction with an automatic spring ejector and Warner and Swasey No. 2 collets may be substituted wherever Mongovco No. 2 standard collets are used.

Roto-Matic Drilling Machine Develops High Production Rate



Roto-Matic horizontal spindle machine drills parts fully submerged in coolant, permitting higher speeds than allowed by dry drilling

This machine was developed by the Davis and Thompson Co., 6411 W. Burnham, Milwaukee 14, Wis., as a high production machine capable of drilling identical or similar parts, parts that require drilling from both sides, or parts that require a drilled hole from 7 to 12 in. deep.

When deep holes are drilled from both sides, completely thru the work piece, drills are fed by means of a cam so that the feed on one end carries drills to within approximately ⅜ in. of the center line of work piece. The drill from the opposite side feeds beyond the center line to complete the hole. Starting drill backs out while hole is being completed.

Two 20 hp. motors constitute the driving force for the drill spindles while the motor on the left side also rotates the mandrel fixtures and spindle housing. This arrangement provides for the continuous operation of the machine.

Operator places the work pieces in the machine at the loading station. As the work advances, the automatic chain clamping is actuated and the piece securely clamped preparatory to drilling. Cams feed spindles and drills to and through the work. After the operation is completed, the spindles are returned to their starting position by a return cam and the clamping is automatically released.

A feature of this machine is that the entire fixture and work piece are submerged in a coolant tank while the drilling is being performed. This assures coolant to the drill point while the work piece is cooled from the outside. A chip conveyor continuously removes chips from the bottom of the tank while the machine is in operation. Chip conveyor is driven by an independent motor.

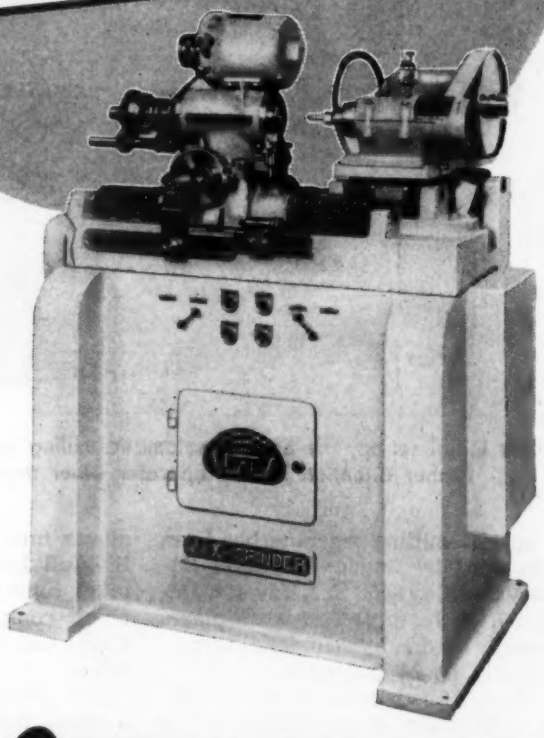
A manual clutch lever is provided for stopping the feed while the motors are controlled by push buttons.

Hornlume Asphalt Coating Provides Aluminum Surface

The A. C. Horn Co., 43-36 10 St., Long Island City 1, N. Y. are the producers of an asphaltic base, suspended aluminum, roof coating. When the coating is applied, the aluminum flakes in suspension float to the surface and form an interlocked surface layer of aluminum. The aluminum surface protects the asphalt from deteriorating effects of sunlight by reflection. The asphalt is protected from excessive heat absorption from infra-red rays and remains chemically stable. Roof temperatures are lowered as much as 22 F. The lowered asphalt temperatures, in combination with the metallic seal, prevent the loss of solvent through heat bubbling and evaporation.

Here is An Innovation In INTERNAL GRINDER DESIGN *that offers*

WIDER RANGE
SIMPLICITY OF OPERATION
SPEED and PRECISION



Choose the Maxi-GRINDER for ultra-finish and extreme accuracy on *any* internal grinding operation. The features listed below qualify this unit for your toughest jobs.

Convenient grouping of controls leaves operators right hand free for loading and unloading work head.

Entirely automatic collet opening and closing.

Mechanical differential unit drives grinding-spindle carrier —eliminates bell-mouth holes.

Easily adjusted stroke length adapts unit to shoulder and blind hole grinding.

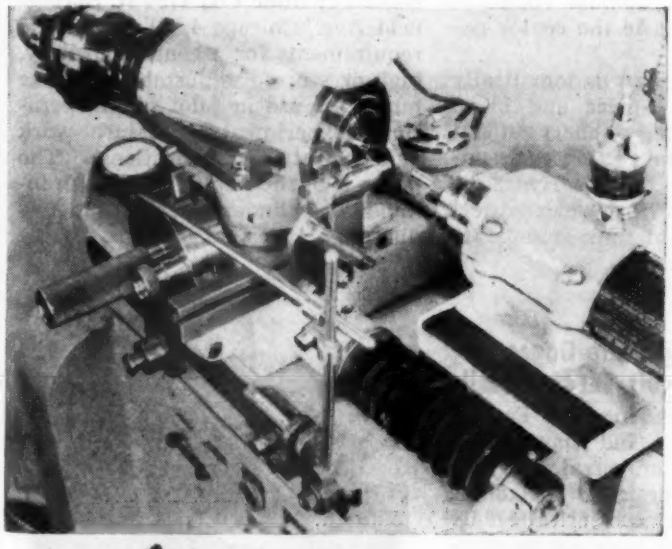
Six spindle speeds, can be slowed quickly for wheel dressing.

Micrometer feed on diamond wheel dresser quickly adjusted.

Totally enclosed feeding mechanism is free of backlash, protected from dust.

Built in sine bar simplifies taper and angular hole grinding.

Separate motors provided for each operation. Push buttons control all functions.



Wilson MACHINE PRODUCTS CO.
1231 Beaufait Ave.
DETROIT 7, MICH.

Order **your copy of the new *Maxi-GRINDER* Catalog . . . no obligation**

Please send the new Maxi-Grinder Catalog to me at once.

Name .....

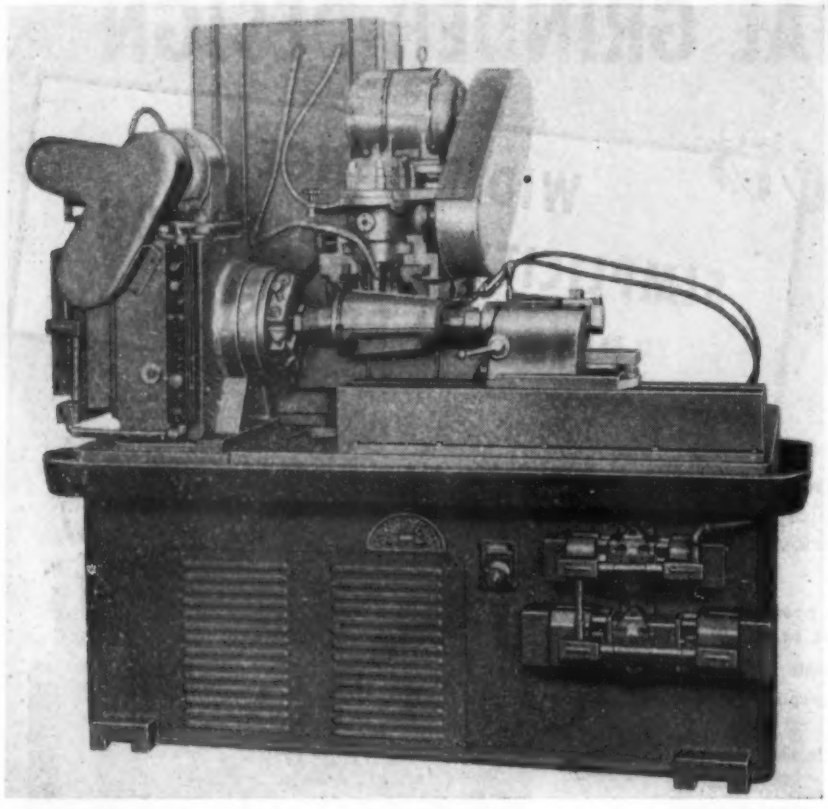
Company .....

Street .....

City .....

State .....

Snyder Automatic Milling Machine Processes Parts at Fast Rates



After initial set-up, the Snyder automatic milling machine operates without further attention by the operator other than replacing stock

A special milling machine has been developed by Snyder Tool and Engineering Co., 3400 E. Lafayette, Detroit 7, Mich., to process work-pieces from ¾ in. dia. by 4 in. length up to 6 in. dia. by 24 in. length.

The tailstock center is spring loaded. Indexing is by means of a motor-driven Geneva mechanism, including a positioning pin and a master control drum governing the length of travel of the milling cutter head. This mechanism automatically selects a long or short cut to be taken along the work-piece.

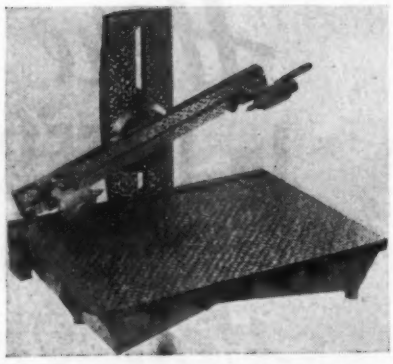
The reaming cutter is held in an arbor in a worm driven spindle. The spindle housing is installed on a cross slide which is adjustable for depth of cut and diameter of work. The lower portion of this cross slide is used for longitudinal feed and the length of the feed stroke is adjustable according to the requirements of the work length.

When the machine is started, the master control drum (being positioned for either a long or short cut), sets up electrical control devices, the cutter head travels to the end of its limit switch setting, the cross slide moves into the work and feeds for the full length of the work to its other limit switch setting. The cut being completed, spindle slide retracts and returns to the center position.

The machine then automatically indexes the work-piece and in so doing selects a long or short cut setup and repeats the cutting cycle until all cuts are made. Hydraulic equipment is in the welded steel base. The coolant tank is separate from the machine.

Master Checking Plate Gages Difficult Set-Ups Easily

Master Industries, Inc., 709 East 38 St., Indianapolis 5, Ind., have developed a master universal checking plate. It is so designed that angle blocks and other accessories usually used on a surface plate can be eliminated. Instead, bench centers, riser plates, angle plates and a vertical riser bar for holding work at any angle between centers, all mounted from the scraped back side of the plate, are furnished in the standard



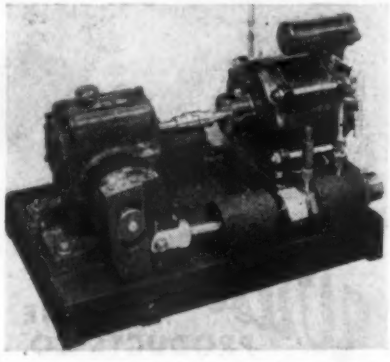
Master plate utilizes a finished side base for checking instruments

unit. In addition, a 20-in. universal sine bar, which also mounts on this scraped back of the plate, is furnished, making it possible to check angle and taper work, between centers or in V-blocks with extreme accuracy.

By use of this sine bar, ring gages for checking taper plug work can, in most cases, be eliminated. Plates of various sizes can be furnished; however, due to the design, a plate of any given size will give approximately 50 percent more working area than a conventional style plate of the same size.

U.O.P. Adjustable Stroke Pump Delivers High Pressures

Developed in collaboration with the Universal Oil Products Company, the U.O.P. duplex high pressure pump, manufactured by the Precision Scientific Co., 1754 N. Springfield Ave., Chicago 4, Ill., meets the requirements for a continuous-duty, high-pressure, adjustable stroke pump for use in pilot plant operations, experimental pressure work and industrial applications. The pump is of the duplex type, with individual cylinders permitting two different types of liquids to be



Volumetric efficiency of the U.O.P. pump is over 90 percent

1ST QUARTER 1944

2ND QUARTER 1944

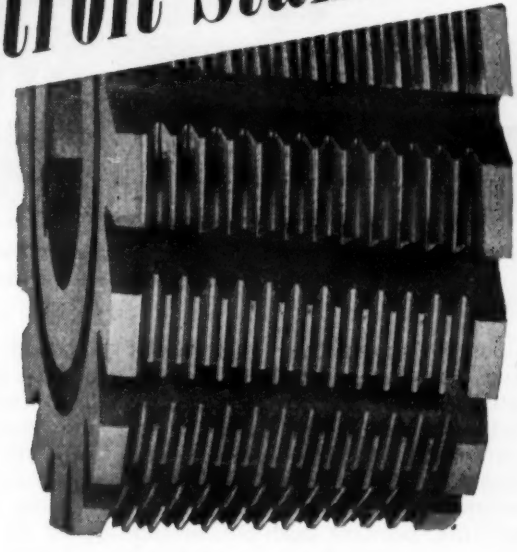
3RD QUARTER 1944

4TH QUARTER 1944

1ST QUARTER 1945

ORDERS FOR DETROIT STANDARD THREAD MILLING CUTTERS

They're Specifying Detroit Standards



Look at that quarter by quarter record of orders for DETROIT STANDARD thread milling cutters—yes, and DETROIT makes specials, too.

Those DETROIT standards—amplified by new types and sizes as needed—are becoming the accepted standards of Industry.

Many companies now simply order their thread milling cutters by DETROIT STANDARD Blank number and desired thread form. Eliminates Tool Engineering, saves delivery time.

Detroit Thread Milling Cutters, standard and special, are making unnecessary the slower more costly method of grinding on scores of precision threaded parts.

Ask for latest Bulletin giving standard sizes

• TAPPING MACHINES • TAP RECONDITIONERS •

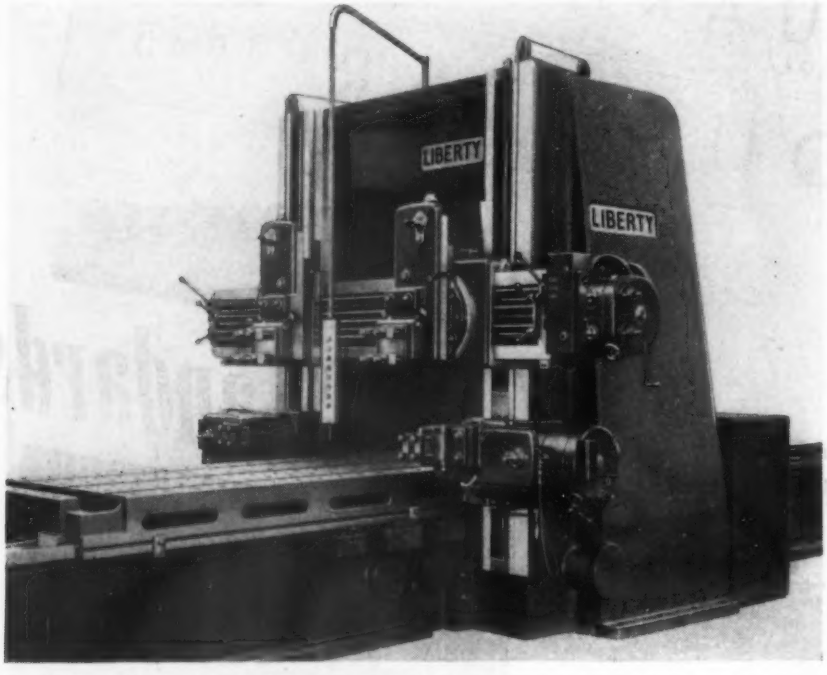
DETROIT TAP & TOOL CO.

8432 BUTLER AVE. DETROIT 11, U.S.A.

• TAPS—THREAD GAGES • CUTTER HOOK AND SPACING CHECKER •

pumped simultaneously, or where increased volume is desired above the capacity of a single cylinder, both cylinders can be piped in parallel. Because of the compact design, these pumps are adaptable to most applications where space is at a premium. The design of the duplex pump permits continuous operation and will maintain a given flow rate continuously, delivering full rated output at maximum rated pressure.

Liberty Planers Improved Controls Speed Set-Ups and Increase Feeds



Pendant switch of the Liberty planer can be swung from the front to rear of the machine to facilitate set-ups and improve visibility

Liberty Planers Inc., 1007 Weller Ave., Hamilton, Ohio, have incorporated improvements in their double-housing planers with 36 to 120-in. span and the openside planers with spans from 36 to 96 in. Dual control levers mounted on both sides of the machine, pendant push-button control station for the rail and heads and push-button control for the crossrail, head and toolslide traverse, starting, stopping and inching are among the developments claimed.

The rail is automatically clamped by a motorized unit as soon as the rail control button is de-energized. This unit has an equalizing plate which distributes the same amount of pressure on each housing. The rail is independent of the side-heads, and has individual motor for the power-feed rapid traverse of the rail-head and for elevating and lowering the crossrail.

Feeding and rapid traverse of the heads are accomplished by a friction drive which serves as a safety in case the heads are accidentally run against each other or against a stationary piece of work. This feature is also provided for the side-heads, which are independent units with individual motors. The side-heads are located in parallel alignment with the rail-head to permit all tools to be located in the same plane. This arrangement makes it unnecessary to lengthen the stroke when cutting simultaneously with tools held in the rail- and side-heads.

Forced-feed lubrication to the ways of the bed, table and bearings is provided by motorized pump. Pneumatic tool-lifters are furnished for all heads. The complete feed-box mechanism includes all safety features, the clutches being interlocked for operations such as feeding, rapid traverse, or elevating.

These machines can be furnished with cutting and return speeds up to 240 ft. per min. or higher if required, and down to 4 to 5 ft. per min. for cutting hard materials and for operation with special attachments.

Harcast Welding Rod Fuses Cast Iron with Mild Steel

Harcast, an all-position mild steel electrode for welding and repairing cast iron is a development of the Harnischfeger Corp., Milwaukee 14, Wis. It fuses well with either mild or medium carbon steel, thus making it suitable for joining cast iron with other types of steel. With a yield point of 50,000 lb. per sq. in., the deposited metal has an ultimate tensile strength of 60,000 lb.

Usable with either a.c. or d.c. machines (straight or reversed polarity), Harcast works well at low amperage, minimizing the dilution effect at the fusion zone and permitting a higher quality of machining. Reverse polarity on d.c. current produces a smooth bead with deep penetration. On d.c. straight polarity, penetration is less, higher beads are built, and there is less spread in the fusion zone. Inclusions in the weld are minimized and surface oxidations or scale are soft and easily removed.

Minuteman Light Unit Prevents Accident Due to Power Failure

The Minuteman is a battery-operated emergency lighting unit manufactured by the Electric Cord Co., 50 Church St., New York 7, N. Y.

Batteries are kept in full charge by a built-in rectifier. In the event of power failure, an automatic relay closes the lighting circuit to provide illumination from the battery-operated flood lights. As the unit is self-contained, it may be removed from its permanent station to provide a portable source of floodlighting. The two lights will provide illumination over a 20,000 sq. ft. area for 4 hours.

Minuteman automatically supplies light when regular power fails

5 TO 20 TIMES THE WEAR WITH STELLITE

Being basically different from the metal in the part being gaged, and having a low coefficient of friction and extreme resistance to abrasion, Cadillac Stellite Gages outlast ordinary steel gages 5 to 20 times.

In an armament application in which abrasive had become embedded in the part during the thread grinding operation, Cadillac Stellite Gages checked—accurately—30 times as many parts as the gages previously used.

This high resistance to wear reduces gage costs 50% to 80% and may accomplish even greater savings in reducing the number of parts rejected because of faulty gaging with worn gages. Try Cadillac Stellite on your *tough* gaging jobs.

PHONE US—*REVERSE THE CHARGES!*
Your inquiries are welcome. Phone us regarding any gaging problem whatever—reverse the charges.

Cadillac GAGE COMPANY
20316 HOOVER ROAD • DETROIT 5, MICHIGAN

Michigan Sine-Line Gear Checker Checks Tooth Space on Action Line

Sine-Line machine checks accuracy of tooth spacing along the line of action and spacing along the base pitch circle in one operation

A precision gear checker (Model No. 1130), specifically designed for the rapid, accurate checking of tooth spacing on gears has been added to its Sine-Line checking equipment by Michigan Tool Co., 7171 E. McNichols, Detroit 12, Mich. The machine checks the base pitch and tooth spacing along the line of action on spur or helical gears. Spacing can also be checked on worm gears. Gears up to 12 in. O.D. having a maximum shaft length of 18 in. may be checked.

The principle of operation of this machine is based on the fact that the distance between the two corresponding sides of adjacent teeth along the line of action is equal to the distance between corresponding sides of adjacent teeth measured on the gear's base pitch circle. The machine measures along the line of action, thus indicating whether the spacing is correct along the line of action and along the base pitch circle of the gear.

When setting up a gear for checking on Model No. 1130, the fixed contact point and the indicator contact point are set tangent to the base circle on the same sides of adjacent teeth. When so set, they will measure along the line of action. A spring actuated finger maintains a constant pressure to insure consistent accuracy of each successive reading.

The gear to be checked is mounted between centers on the spacing checker. Both headstock and tailstock of the machine are movable so that the gear may be lined up readily with the contact point fingers. Errors in spacing are shown directly on an indicator graduated in ten-thousandths of an inch.

An indexing pawl operated through a single action lever automatically indexes the gear from tooth to tooth.

Gears having the same pitch and base pitch may be checked without changing the setup of the machine. Helical gears are checked in the transvere plane. The normal plane may be checked by swiveling the indicator barrel to the correct helix angle.

The Model No. 1130 machine is designed so that the Michigan AY-1 recorder can be used with it, when a chart record of the spacing of each tooth and total variation in spacing is desired.

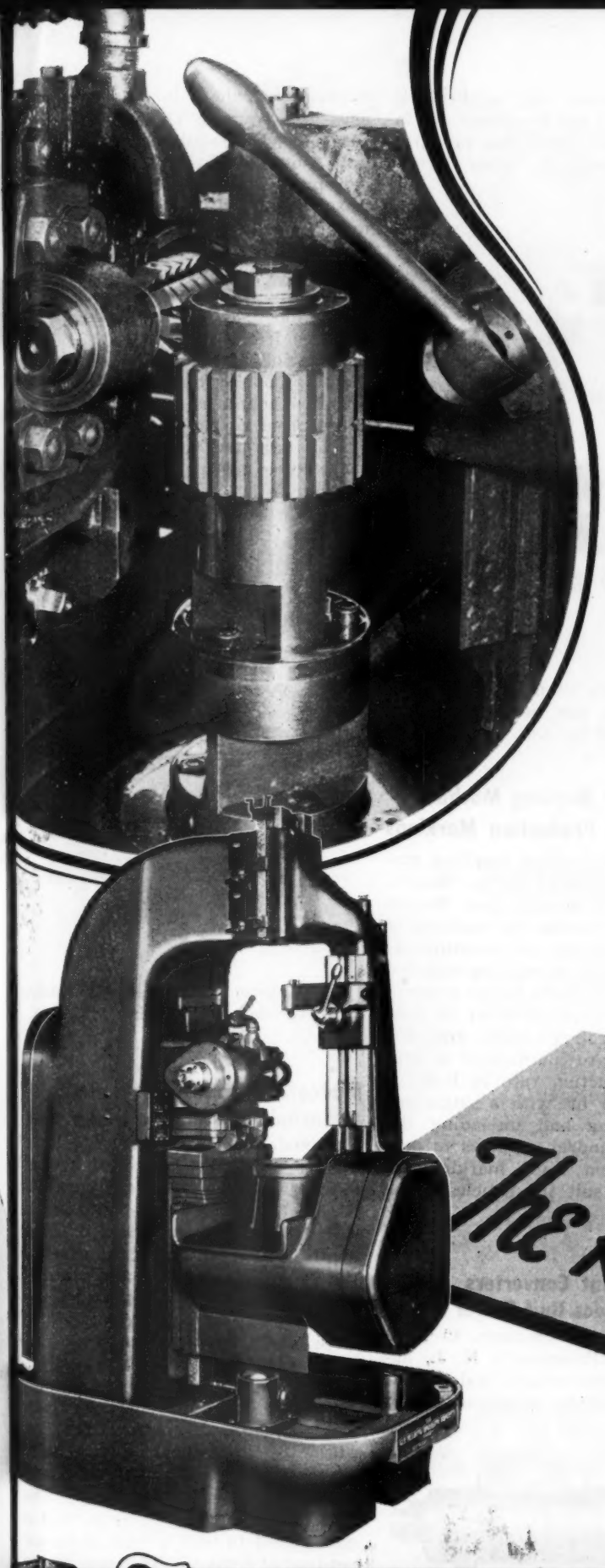
A handwheel-operated rack and pinion permits the indicator table to be quickly adjusted to line up the contact points tangent to the base circle. Gage blocks enable accurate adjustment of the contact points. Adjustments are also provided to limit the retraction of the table when indexing from tooth to tooth.

Head and tailstock centers are hardened and ground. Head and tailstock ways are precision-scraped. The base of the machine is designed with ample knee and foot room for the operator. A cabinet for housing arbors, indicators and other equipment is built into the machine's base.

Nickel-Arc Cast Iron Rod Produces Homogeneous Welds

Alloy Rods Co., York, Pennsylvania, announces the addition of a machinable cast iron welding rod to its products. Nickel-Arc may be used on a.c. or d.c. current in all positions. No preheat is required to obtain porosity-free deposits machinable in the weld deposit fusion zone. The weld deposit is free from cracks or cross checking in multiple pass welds, and after machining or grinding, the deposit closely matches the color of the parent cast iron. The homogeneous weld deposits also withstand hydrostatic pressure.

Welds made with Nickle-Arc welding rods are protected from corrosive effects by the nickel content of the alloy, which is sufficiently low to minimize the galvanic action.



● Here's a close-up of a Rigidhobber cutting spur gears. The two blanks are mounted on the work spindle which is equipped with indexing gears to feed the work by the hob. This is a climb cut operation—feed .050, cutting speed 70 F.P.M.

Each gear has 23 teeth—5-7 pitch and material is S.A.E. 4620 Steel—hardness 70-80-R "B". Length of cut is 4⅜ inches. One full revolution of the work spindle completes, in this case, the roughing cut on the gears. Floor to floor time averages 25 minutes for the two gears.

On this job 90 gears were cut on one grind of hob and hob life is equivalent to 1000 gears.

The vertical construction of the Rigidhobber permits all chips to fall away the work resulting in a clean, accurate gear tooth.

Simplicity of changing hob and ease of loading work make the Rigidhobber a profitable producer on both short and long runs.

Consult Cleveland Hobbing Engineers on your precision gear and spline work.

This bulletin tells all about Rigidhobbers—what they are—how made—and how they can help you reduce costs.

For High Production of Accurate Gears

The Rigidhobber

The CLEVELAND HOBBING MACHINE Company

General Offices: 1311 CHARDON ROAD CLEVELAND 17, OHIO

Chicago Office: 624 S. MICHIGAN AVE. CHICAGO 5, ILLINOIS

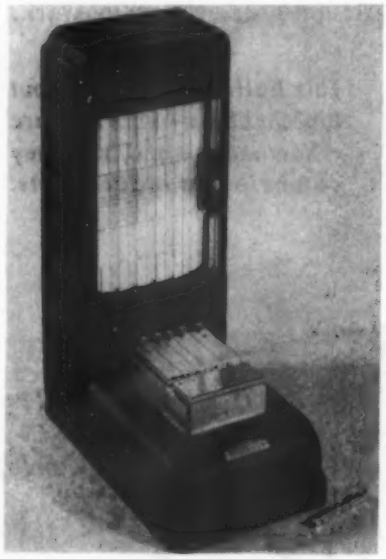
BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS

Precisionaire Automatically Gages Parts to Close Limits

A high amplification 5-tube Precisionaire has been developed by the Sheffield Corporation, Dayton, Ohio.

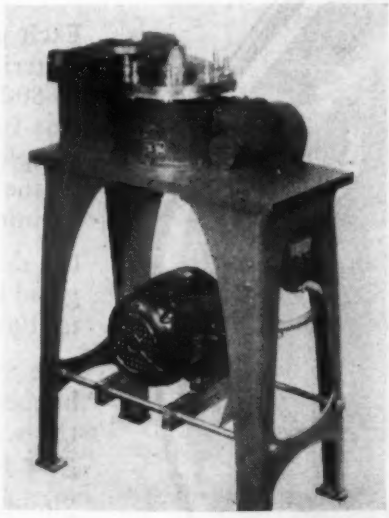
Five tubes, each capable of providing an amplification of 18,000 to 20,000 to 1, are combined in one instrument to check ten points along the one-half inch diameter of a part. The tolerance at each point is plus-or-minus five millionths of an inch. Eccentricity, taper and undersize or oversize conditions are disclosed. The part for which this application is designed mates with a part which is checked by a similar instrument.

The part is checked by placing it against the left side rail and rotating it through 180 deg.; this operation simultaneously checks five points along the diameter. It is then placed against the right side rail and again rotated through 180 deg., which gives a simultaneous check of five other points along the diameter. Tungsten carbide locating pads at the bottom and both sides of the gaging slot serve to properly locate the masters and work part.



Maximum and minimum tolerance limits are indicated by lines on the transparent adjustable sight

Minimum and maximum fixed size masters are used to set up the Precisionaire. The center line on the transparent slide is used as reference for this setting. With the maximum size master in gaging position, the orifices and air pressure in each tube are so regulated that all five floats are at the same horizontal line. The same method is used in setting the minimum master and a check is made to see if the five floats are in a straight line. After this preparatory adjustment, no other is required.



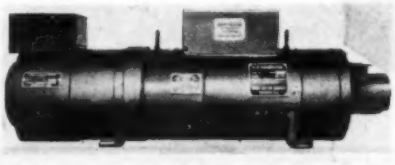
Indexing table of the Force marking machine can be loaded and unloaded by one operator

Force Rotary Marking Machine Speeds Production Markings

The horizontal rotary marking machine, manufactured by the Wm. A. Force Co., 216 Nichols Ave., Brooklyn 8, N. Y., enables the marking of parts to be placed on a continuous production basis. A rotating mandrel table passes the parts before a marking die which revolves on its own axis. The rotary table and die mechanisms are coordinated to provide a production rate as high as 1,500 pcs. per hr. with a single operator loading and unloading the machine. Mandrel supports to prevent deflection while marking are provided to suit the articles to be marked.

Bogue Current Converters Provides Unit Power Source

Bogue Electric Company, 40 Kentucky Ave., Paterson 3, N. J., announces a light-weight, sealed type, two-bearing motor-generator set for applications where many d.c. voltages are required. The unit has no sub-base as is required by multiple unit motor-generator sets. Of the drip-proof and shock-proof type, it is semi-enclosed and has five commutators and a pair of slip rings. It is built for d.c. operation but can be furnished with either d.c. or a.c. driving motors. Provides a.c. voltages and several specified d.c. voltages from 12 to 2000 volts. It has fine voltage regulation and meets low ripple requirements. Special terminal boards are contained in a shock-proof housing mounted on top of the unit for accessibility. The sealed-type bearings require no attention.



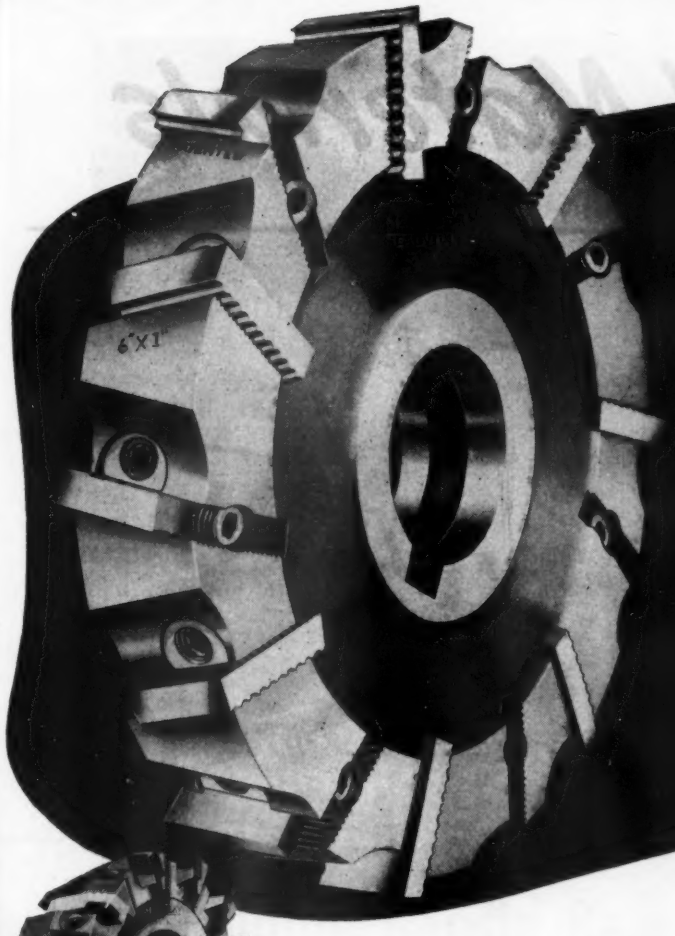
Bogue motor-generator set can be mounted in restricted space

Madco turret is provided with ball and detent index indicator

Madco Drill Press Turret Head Includes Automatic Depth Stop

The model 275 turret head for drill presses manufactured by Madco Products, 516 5 Ave., New York 18, N. Y., features an indexing depth stop designed to control the drilling depth of each of the six spindles of the head. The depth stop mechanism comprises a completely enclosed drum having six adjustable stops. The drum is geared to the turret mechanism and is arranged to index with the spindles.

Spindles are No. 1 Morse taper precision ground to tolerances of 0.0002 in. Bearings are of the fully enclosed, sealed lubricant type and the clutch is a friction type. The head has a capacity of ½ in. and is guaranteed to hold a total indicator reading of 0.001 in. The case of the Madco turret is made of aluminum and all points subject to wear are steel-clad.



McCROSKY Jack-Lock MILLING CUTTERS

TRADE MARK REG. U.S. PAT. OFF.

Engineered for Increased Production, Lower Costs

● You can operate safely at higher feeds and speeds,—get more pieces per day, at lower cost per piece, with McCrosky Jack-Lock Milling Cutters. Originated, perfected and available only from McCrosky,—Jack-Lock Cutters hold the blades rigidly and solidly, yet permit easy release of the blades without hammering. Fine pitch back-up screws assure accurate and uniform blade adjustment. Consequently a minimum of blade stock is lost in regrinding, a particular advantage when carbide tips are used.

Specify McCrosky service-proved Jack-Lock face mills, shell-ends, half-side, staggered tooth, and special multiple operation tools for use in your plant,—and get all the design, construction and operating advantages only McCrosky Jack-Lock Cutters can give you. Bulletin No. 16-M gives full details. Send for a copy.

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Designers and Manufacturers of

Jack-Lock MILLING CUTTERS — *Block Type* BORING BARS

Wizard CHUCKS AND COLLETS

Super Adjustable REAMERS — *Turret* TOOL POSTS

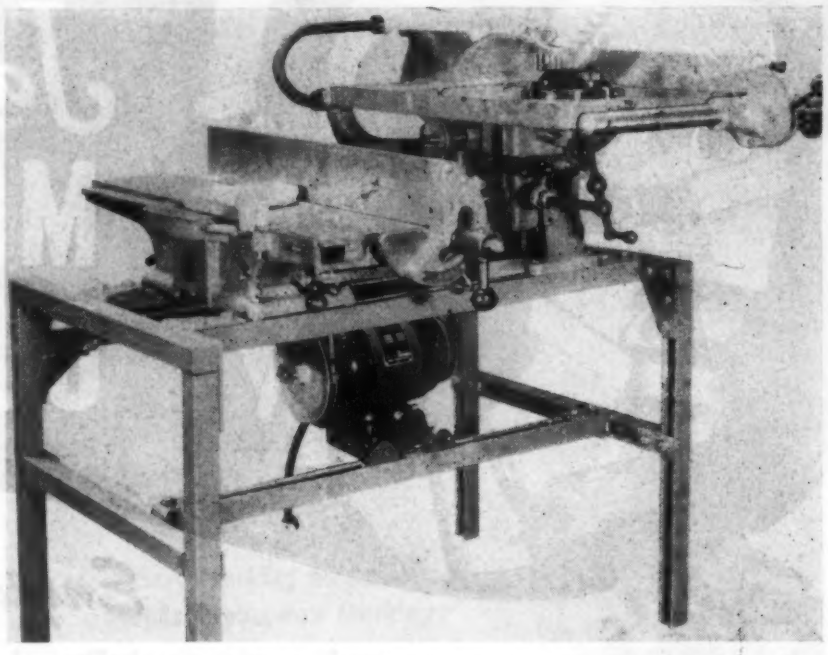
Parts and Materials

Unistrut Construction System Standardizes Support Frames

Fabrication of any type metal frame, stock rack, support or hanger for industrial, electrical, commercial or public building use can be completed on the job by the Unistrut method, supplied by Unistrut Products Co., West Washington Blvd., Chicago, Ill.

Unistrut consists of a slotted hollow-square steel or other metal section and standard spring-held nut attachments. It does not require drilling of holes, riveting or welding, and can be cut to any desired length with a hack saw.

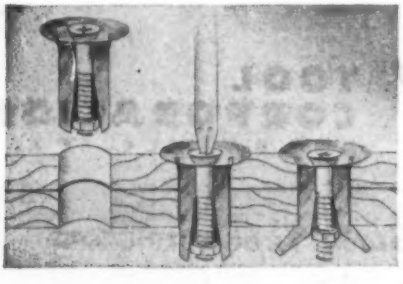
The nut attachment can be slid along in the hollow square to any point or points where it is desired to attach it to another Unistrut member, a supporting structure, or to the floor, ceiling or wall. The Unistrut nut has serrated teeth which bite into the inturned edges of the hollow square section, and hold the attachment in position when the nut is tightened with an ordinary wrench. However, the nut can be easily loosened, the attachment moved to a new location and again fastened.



Unistrut has the necessary properties for use as a compression or tension member, strut or column

Des-Bolt Sleeve Adapts Bolts For Use As Blind Fasteners

The Des-Bolt developed by the Victory Manufacturing Co., 1105 So. Fairoaks Ave., So. Pasadena, Calif., is composed of a molded plastic expansion sleeve and any standard nut and bolt assembly of the correct size to match the sleeve. The sleeve is the important element of the design and is composed of three thin fingers with an inside taper extending approximately three-fourths of their length from the flanged head. The head is a flange with a cored hole to accommodate the bolt shank and countersunk to receive standard countersunk type bolts, with three sharp ribs attaching the flange and sleeve. These thin ribs wedge into the work and prevent the sleeve from turning.



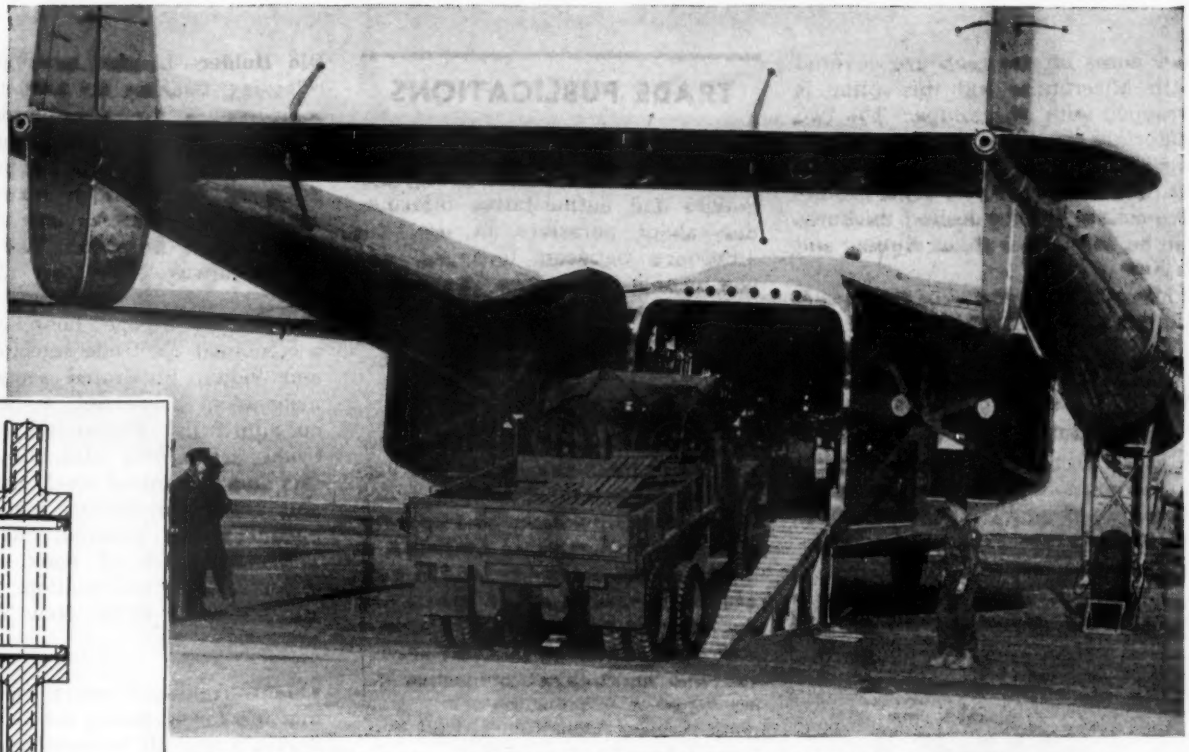
External ribs of Des-Bolt prevent adapter turning when applied

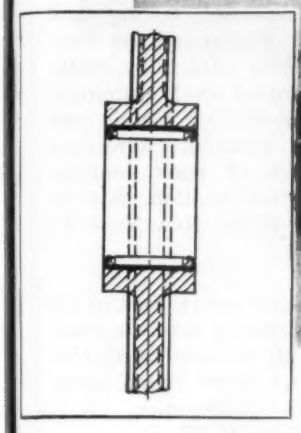
To apply, assembled unit is inserted into a drilled hole the size of the outside diameter of the sleeve, the unit tapped lightly with the screw driver and the bolt tightened. The nut is restrained from turning by the inside tapered surface of the prongs of the sleeve. As the bolt is turned, the nut is drawn into the tapered prongs and begins to force the prongs outward. As the pressure increases by turning the bolt, the work is drawn together. Ordinarily the sleeve extends through the work and as the fastening operation is completed the ends of the prongs are flared outward by the expansive pressure on the blind side of the work. It is not necessary, however, that the sleeve extend entirely through the work since the expansion of the sleeve will solidly hold the unit and provide strong fastening. Sizes range from ¼ to ¾ in. in dia. by ¼ to 3 in. length.

Miccrotube Plastic Tubing Insulates Plating Racks

A product for the insulation of plating racks has been announced by Michigan Chrome and Chemical Co., 6340 East Jefferson, Detroit 7, Mich. Known as Miccrotube, it is an extruded tubing made from an elastic plastic base material that has exceptional resistance to plating baths and cleaning solutions. It will withstand hot plating solutions, including 180-190 F. copper, and practically all types of boiling cleaning solutions without damage or deterioration. It is not recommended for use in trichlorethylene. Miccrotube remains tough and flexible under adverse conditions and will not harden or crack. Its surface is smooth and glossy which permits solutions to drain from the racks thoroughly.

Miccrotube is usually used in combination with Miccrotape. The con-





X-section shows how nacelle door cable pulleys of famous Fairchild C-82 Packet turn on compact, efficiently-lubricated Torrington Needle Bearings. This is one of many applications of these light but sturdy anti-friction bearings to the most modern and efficient aircraft.

Torrington Needle Bearings Carry Heavy Load on Fairchild C-82 Packet

Critically important to the success of the Fairchild C-82 Packet is the care with which its designers have seen that each component part does its job with maximum efficiency and dependability combined with minimum cost in weight and size. That's why the nacelle door cable pulleys, for example, operate on sturdy, compact, *anti-friction* Torrington Needle Bearings. "Needle Bearings were used in this application," Fairchild's Engineering Department reports, "because they were lighter and more compact than any other bearing capable of carrying the same load."

You and your engineers and designers should know of these and other Torrington Needle Bearing advantages in specific terms of your product's requirements. You should know how they increase design and operating efficiency of aircraft, automotive and related equipment where you want maximum performance and dependability for minimum size, weight and cost. Our Catalog 32, showing the wide range of types, sizes and proved-in-use applications, belongs in your files. Why not write for your copy today?

THE TORRINGTON COMPANY

TORRINGTON, CONN. • SOUTH BEND 21, IND.

New York Boston Philadelphia Detroit Cleveland
Seattle Chicago San Francisco Los Angeles Toronto
London, England

TORRINGTON NEEDLE BEARINGS

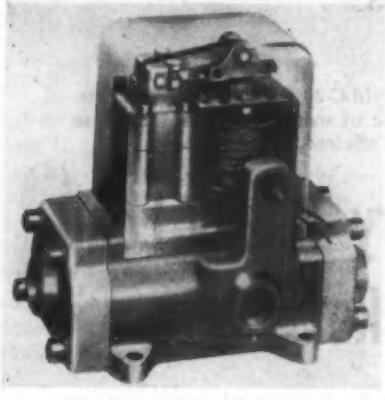
tact wires of the rack are covered with Miccrotube and the spline is wrapped with Miccrotape. The two materials can then be fused by heating into a continuous, homogeneous coating. In this way a solid protective coating of any desired thickness can be obtained without dipping and drying.

Miccrotube is available with inside diameters from 1/16 to 1 in.

Numatic Air Valves Boost Action by Bleeding Airline

A valve with a fluid lever represents an adaptation of a principle introduced by Numatics, Milford, Mich., to decrease the reaction lag of remote control valves.

The actuation of this valve is a combination of compressed air and



Numatic valves are produced in single, 3- and 4-way control types

electricity to effect high-speed control of any single- or double-acting air cylinder up to ¾ in. pipe capacity.

Requiring fewer operating parts, the fluid lever principle makes possible the use of a very small solenoid, drawing 3.6 amp. at 110 volts, in all models of Numatics regardless of valve size.

The higher production efficiency that is claimed is said to come from diverting to operating advantage a portion of the air that passes through the valve. This feature controls the ratio of air balance to an extent that the remaining effort can be handled by a small solenoid. Much of the mechanical burden is thus eliminated and wear of parts is reduced.

The Numatic Valve is also suitable for two-pressure control. The 4-way model can be converted for 3-way use by plugging one port. The straight line air flow minimizes pressure drop, simplifies installation and requires fewer fittings.

TRADE PUBLICATIONS

Abrasives—36-page book giving up-to-date and authoritative information about abrasives in use, the difference between technical and non-technical abrasives, the several kinds of backings, coatings, grain sizes and on what jobs each should be employed. Clover Mfg. Co., Norwalk, Conn.

Bearings—Six-page folder describes the uses of self-lubricating bearings of low coefficient of friction which eliminate maintenance and operator supervision, capable of operating at high rotative speeds as well as high bearing pressures at low speeds and not affected by chemicals. There is also a tabulation of physical, chemical and mechanical properties for six types of bearing material. Morganite Brush Co., 3300 4th Ave., Long Island City, N. Y.

Brakes—Leaflet illustrates the braking characteristics of six types of pneumatic disk brakes and lists four control units for use with these brakes. Several sketches give leading installation dimensions. James L. Entwistle Co., 43 Church St., Pawtucket, R. I.

Corrosion — Four-page leaflet describing corrosion resistance of five types of liquid compounds composed of two major elements one of which is a volatile solvent and the other an active polar compound which remains as a protective coating or film. Film thicknesses vary from 0.0002 to 0.0008 in. A two-page chart gives characteristics of these compounds. Valvoline Co., 430 Main St., Cincinnati, Ohio.

Couplings—Leaflet reviews shock-absorbing flexible couplings of eleven sizes. There is a tabulation of engineering information which will be useful for the engineering department. Automatic Machine & Tool Co., 132 Charles St., Auburndale 66, Mass.

Cleaning—A 24-page catalog answers questions about the use of controlled centrifugal force, instead of compressed air, for abrasive cleaning, which presents all phases of airless blast cleaning. Illustrated with interesting facts, diagrams and tables. American Foundry Equipment Co., 451 S. Byrkit St., Mishawaka, Ind.

Die Holder—Leaffet describes self-releasing, floating die holder which compensates for misalignment of work. All parts are hardened and working surfaces ground or polished. Hi-speed tipped lathe centers and rotating live centers are also included. Arc Precision Tool Corp., 416 Broadway, New York 13, N. Y.

Electrodes—56-page book contains a combined electrode selector chart and index, illustrated sections on mechanical properties, testing, and on approvals. Entire line of electrodes for welding mild, alloy, stainless and galvanized steel, aluminum and other non-ferrous metals and hardfacing is covered. Reference section in back of book contains much welding information. Air reduction, 60 E. 42 St., New York 17, N. Y.

Floors—American emery used in the mixture for surfacing concrete floors makes a smooth impervious surface which does not show rough spots. Empire Emery Corporation, 18 E. 41 St., New York 17, N. Y.

Fixture—Anglefeed Fixture can be swiveled through a full circle and the table tilted from horizontal to full vertical. Swivel and tilting graduations are accurate. Cross feed of the table is 3½ in. Automatic Machine & Tool Co., 132 Charles St., Auburndale, Mass.

Gages—Form 1100 of 8 pages describes the hardness, wear, shapes, limitations and finishing of Norbide gages. Norton Company, 50 New Bond St., Worcester 6, Mass.

Gears — Aircraft Quality Gears, Product Engineering Bulletin A Q A of 65 pages presents complete engineering data, comparative performance curves, design details, operating speeds and other data for this type of gear which closely approaches theoretical perfection. There are numerous mathematical examples to illustrate the use of curves and formulas. Foote Bros. Gear & Machine Corp., 5225 South Western Blvd., Chicago 9, Ill.

Hobs—Bulletin No. 464-45 describes a Sine-Line bench-type checker for contours of hobs ranging up to 6 in. outside diameter with a maximum length of 8½ in. With this checker, all hobs on the same job will produce gears of identical characteristics by quickly locating errors in hobs. The contour of the teeth can be checked to 0.0001 in. The sine

...by Revere increases production

To meet the demand of the electronic and electrical industries, the welding equipment field, and in fact of all companies needing copper of improved machinability, Revere now offers Revere Free-Cutting Copper Rod.

This is oxygen-free, high conductivity copper containing a small amount of tellurium, which greatly increases the speed with which the metal can be machined, makes it possible to hold to closer tolerances, and improves the finish of the completed parts. Electrolytic copper, while suitable for many purposes characteristically machines with long tough stringers which are difficult to remove. Free cutting copper chips are brittle and break readily, clearing from the tools without attention.

These advantages increase production rates, depending upon the amount of machining necessary on each given part. Consequent lowered costs may be an important factor to you.

Revere Free Cutting Copper Rod is available in sizes up to 2" and in all the usual shapes. For details, write the Revere Executive Offices.

CUSTOMERS REPORT:

"This material seems to machine much better than our previous hard copper bar; it cuts off smoothly, takes a very nice thread, and does not clog the die." (Electrical parts.)

"Increased feed from 1½" to 6" per minute and do five at one time instead of two." (Switch parts.)

"Spindle speed increased from 924 to 1161 RPM and feed from .0065" to .0105" per spindle revolution. This resulted in a decrease in the time required to produce the part from .0063 hours to .0036 hours. Material was capable of faster machine speeds but machine was turning over at its maximum. Chips cleared tools freely, operator did not have to remove by hand." (Disconnect studs.)

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Avenue, New York 17, N. Y.

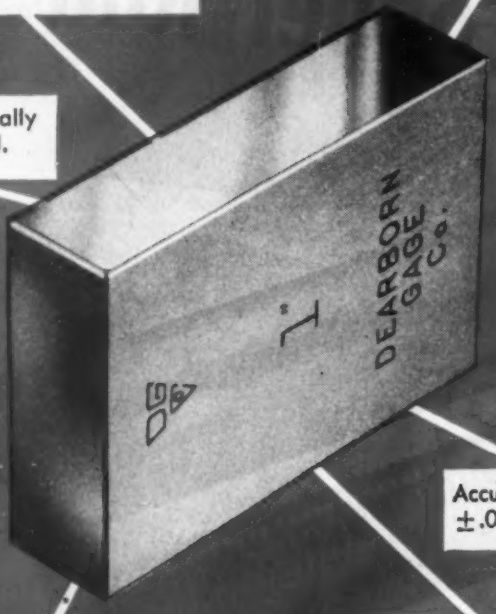
ELLSTROM

CHROMIUM PLATED GAGE BLOCKS WEAR LONGER

The Ellstrom Chromium Plating process results in an extremely hard surface, giving you longer wearing qualities.

Chromium plating resists corrosion and rust.

Unconditionally guaranteed.



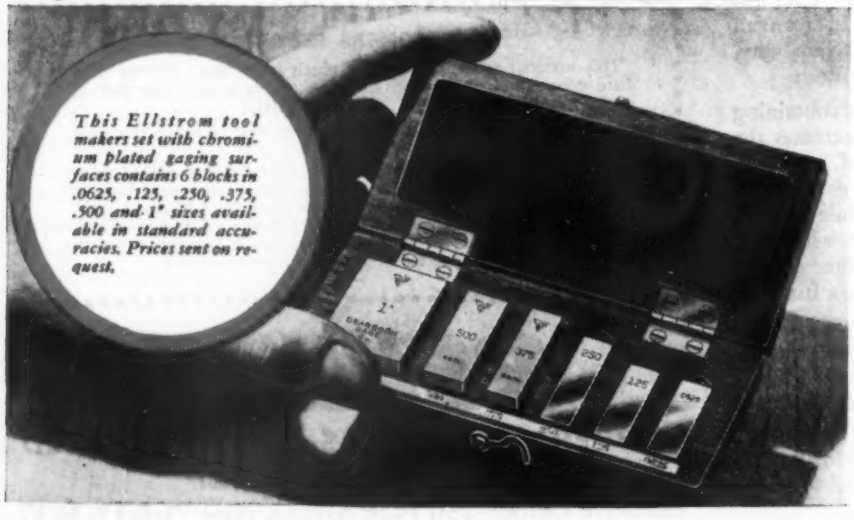
Accurate up to ±.000002"

Deliveries are now reasonably fast on most items. Write today.

Offered individually or in complete sets in choice of three classes

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks



This Ellstrom tool makers set with chromium plated gaging surfaces contains 6 blocks in .0625, .125, .250, .375, .500 and 1" sizes available in standard accuracies. Prices sent on request.

bar eliminates angle blocks for different pressure angles. Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Mich.

Lighting—Leaflet tells of many types of hand and portable lamps useful in emergencies for shop service. Electric Cord Co., 50 Church St., New York 7, N. Y.

Lubrication — Service Handbook, 1945 Edition, describes the application of the four kinds of Lubriplate lubricants with recommendations for their application to bearings, gears, chains and other surfaces. Lubricate Div., Fiske Bros. Refining Co., Lockwood & Armstrong Sts., Newark 5, N. J.

Manufacturing Facilities — 38-page bulletin No. R S lists engineering and manufacturing facilities available for after-the-war production. An eight-page list gives capacities of machinery. York Safe & Lock Co., York, Pa.

Packing—Eight-page booklet illustrates and gives test data about T-Ring packing for use in hydraulic systems, it is non-extrusion and does not require close fitting surfaces. The Weatherhead Co., 300 E. 131 St., Cleveland 8, Ohio.

Packing Boxes—Booklet "The General Box" is illustrated and gives information about today's container situation. A new type of corrugated container has been added to the line; also describes other corrugated and wooden containers. General Box Co., 510 N. Dearborn St., Chicago, Ill.

Presses—Bulletin No. 4407 shows many types of forging which require hydraulic presses. The Hydraulic Press Mfg. Co., 830 Marion Road, Mt. Gilead, Ohio.

Rubber—Fifth edition of "Manhattan Rubber Products for Industry" is a condensed catalog of mechanical rubber goods, particular emphasis being given to transmission and conveyor belting, V-belts, hose, packing, molded rubber products of many types. The Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., 92 Townsend St., Passaic, N. J.

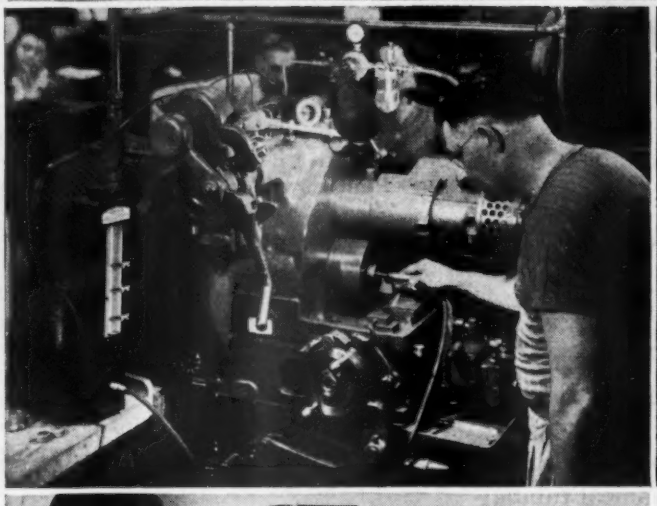
Spot Facer — Four-page Bulletin BSF445 contains engineering data relative to the application of an offset back spot facer, both standard and special, for spot facing, slotting, grooves, or countersinking in places difficult for ordinary machine tools

MODERN PROCESS CONTROL *Slashes Production Costs*

Today's use of precision indicating instruments at the machines to check parts as they are being produced is a thrifty practice and results in slashing production costs. Inspection of each piece as it is made, with no extra time required, enables the operator to adjust the machine or tools before scrap is produced. Each operator produces a far higher percentage of acceptable parts—good parts which might previously have been improperly rejected are accepted—rejections are reduced—and the scrap pile, as such, is eliminated.

Time is saved on the assembly line because every part fits as it should — no subassemblies have to be torn down and reassembled. Salvage and rework time are practically eliminated. The completed product will be of higher quality, require less service and give more years of trouble-free performance.

Spending money for Sheffield Precisionaires, Visual Gages, Multicheks, Dial Indicator Snaps, Thredcheks, etc. . . . results in saving money by slashing production costs.



LET A SHEFFIELD REPRESENTATIVE *Demonstrate* THESE INSTRUMENTS . . . and show how they can help you produce high quality products on a competitive cost basis.

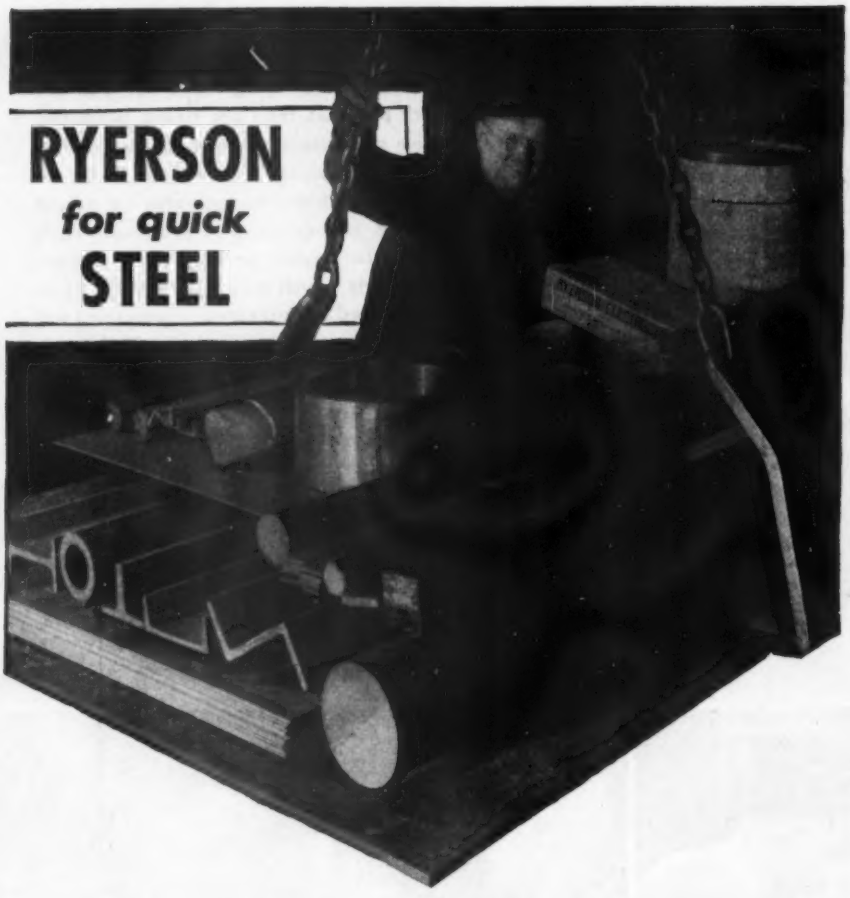
ARMY E NAVY

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

SHEFFIELD MASTER CRAFTSMEN



Over 10,000 kinds, shapes and sizes in stock

Call the plant nearest you

CHICAGO.....16th and Rockwell Sts.
Rockwell 2121

MILWAUKEE.....320 So. 19th St.
Mitchell 7000

DETROIT.....1600 E. Euclid Ave.
Madison 3860

ST. LOUIS.....5 Clinton St.
Central 1020

CINCINNATI.....Front St. and Freeman Ave.
Cherry 3232

CLEVELAND.....E. 53rd and Lakeside Ave.
Henderson 1000

PITTSBURGH.Arch St. & Bell Ave., Carnegie, Pa.
Walnut 7540; Carnegie 3063

PHILADELPHIA.....5200 Grays Ave.
Bell-Belgrade 1412; Keystone-West 1644

BUFFALO.....40 Stanley St.
Humboldt 3311

NEW YORK.....203 Westside Ave.
Jersey City, N. J.
New York City.....Rector 2-3700
Newark.....Market 2-6067
Jersey City.....Bergen 4-1123

BOSTON.....Third & Binney Sts., Cambridge
Kirkland 6000

Concentrate your steel requirements for hot and cold finished bars, alloy steels, mechanical tubing, Allegheny Stainless, structurals, sheets, and other steel products with Ryerson. Our engineers and metallurgists will be glad to work closely with you. Their experience in selection, fabrication and heat treatment may prove of value to you.

Call Ryerson for prompt action . . . no matter what steel you need.

JOSEPH T. RYERSON & SON, INC.

RYERSON STEEL-SERVICE

to reach. Edlund Tools, Inc., 4473 Woodward Ave., Detroit 1, Mich.

Steel—Fifth edition of Mo-Max Handbook which gives standard and special analyses of this steel, instructions about forging, annealing, hardening, quenching, tempering, subzero treatments, tool performance, hardness and informative curves. The Cleveland Twist Drill Co., Department P, 1244 E. 49 St., Cleveland 14, Ohio.

Superchargers — Booklet "Supercharging for Greater Power and Improved Performance" reviews the history of supercharging, the mechanical principles of the Roots type of positive displacement supercharger and the methods of manufacture and application. B-W Superchargers, Inc., Capitol Drive, Milwaukee, Wis.

Temperature Control—Three issues of technical bulletin "Tempil° Topics" cover some of the problems of temperature control and give suggested solutions. No. 1 is for "Flame Cutting," No. 2 is for "Aluminum and Its Alloys," and No. 3 is for "Fabrication in Safe Temperature Ranges." Tempil° Corp., 132 W. 22 St., New York 11, N. Y.

Temperature Control—Catalog 325 contains 48 illustrated pages on "Precision" Freas constant temperature control cabinets, electrically heated ovens for many uses, vacuum ovens, combustion-tube furnaces and other laboratory equipment. Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill.

Tools—Booklet describes "T and V" cutting alloy, gives analyses, applications and heat-treatment of this tough and versatile cast-to-shape non-ferrous alloy which bridges the gap between high speed and cemented carbide cutting tools. Included are tables of cutting speeds, sizes of tool bits, and grinding wheel recommendations. Jessop Steel Co., 500 Green St., Washington, Pa.

Turrets—Eight-page leaflet about five-station lathe turrets made in four sizes, which can be mounted on the cross-slide of a lathe; also shows tools and toolholders with accessories. Automatic Machine & Tool Co., 132 Charles St., Auburndale 66, Mass.

Welding—Bulletin 345-W describes a hard surfacing rod of many uses, the steel of which is composed of high carbon, high chromium, high

SUNOCO EMULSIFYING CUTTING OIL

helps drills cut free and clean...prolongs drill life

Drills that hold their edges cut clean, cut fast, cut accurately and keep production moving. That's why leading metal working plants use Sunoco Emulsifying Cutting Oil to keep drills pointed for production.

Long drill life is what makes such manufacturers as the American Tool Works Company choose, use and recommend Sunoco Emulsifying Cutting Oil. In the photo above is an American 5'-15" Column Hole Wizard Radial Drill. A 3½" hole is being drilled in SAE 1020 cast steel at a speed of 83 RPM and a feed of .018"

Outstanding cooling and lubrication properties of the mixture of 1 part Sunoco and 20 parts water effectively protects the point of the drill. The drill clears easily, does not clog, chatter or burn. Drills last longer and the work is accurately finished with a fine surface.

Whatever the operation . . . drilling, reaming, boring, turning or milling, Sunoco Emulsifying Cutting Oil can help speed production in your plant. Get the details on how others have benefited with Sunoco. Write for your free copy of "Cutting and Grinding Facts" to . . .

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

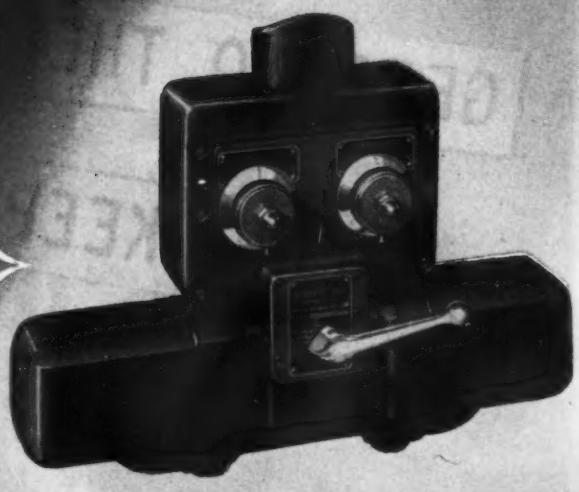
SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

SMOOTH and CONSTANT FEED RATE

regardless of fluctuations in work resistance or hydraulic operating pressure



Double Solenoid Type
Push-button Operation

VICKERS "Traverse and Feed Cycle" CONTROL PANELS

These panels provide self-contained, compact control units for automatic machine applications where the cycle is a combination of rapid advance, one or two feeds, and rapid return motions. The two feed rates are infinitely variable within their ranges, and adjustments can be made during feed. Applications include drilling, reaming, boring, turning, milling and swaging machinery.

The hydraulic circuit in the panel employs the well-known Vickers Flow Control Valve in a "metering-out" circuit which means a smooth and constantly maintained feed rate for any given adjustment regardless of fluctuations in cutting tool resistance or changes in hydraulic operating pressure.

Simplicity is evident from the fact that there are only two working parts that move. Many standard modifications are available; feeds can be in either direction or both directions; operation is by single or double solenoids integral with panel, separate solenoids or pilot pressure. Practically any cycle sequence can be obtained. See Bulletin 41-10 for complete information.

Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

VICKERS *Incorporated*

1410 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices:
CHICAGO · CINCINNATI · CLEVELAND · DETROIT · LOS ANGELES
NEWARK · PHILADELPHIA · ROCHESTER · ROCKFORD · TULSA · WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

CONSTANT DELIVERY PUMPS · FLUID MOTORS · DIRECTIONAL CONTROLS · VOLUME CONTROLS · PRESSURE CONTROLS · CONTROL ASSEMBLIES · VARIABLE DELIVERY PUMPS

molybdenum, tungsten and vanadium; used in making, altering and salvaging cutting tools and forging dies. American Brake Shoe Co., 388 E. 14th St., Chicago Heights, Ill.

Welding—Leaflet "How to Repair Tractor Parts by Arc Welding" has a table showing the savings by rebuilding worn parts. General Electric Co., Schenectady, N. Y.

Welding—Leaflet describes the uses of six kinds of ferrous and non-ferrous electrodes. Welding Equipment and Supply Co., 223 Leib St., Detroit 7, Mich.

X-Ray—Bulletin 1345 illustrates applications of low voltage radiography. Leaflet on X-ray tubes has dimensions type A2 diffraction tubes, also shows type EG50-50 PKV tubes. Leaflet on Penetrameters for inspection of materials for soundness to show changes in density and defects. Picker X-Ray Corp., 300 4 Ave., New York 10, N. Y.

NEW BOOKS

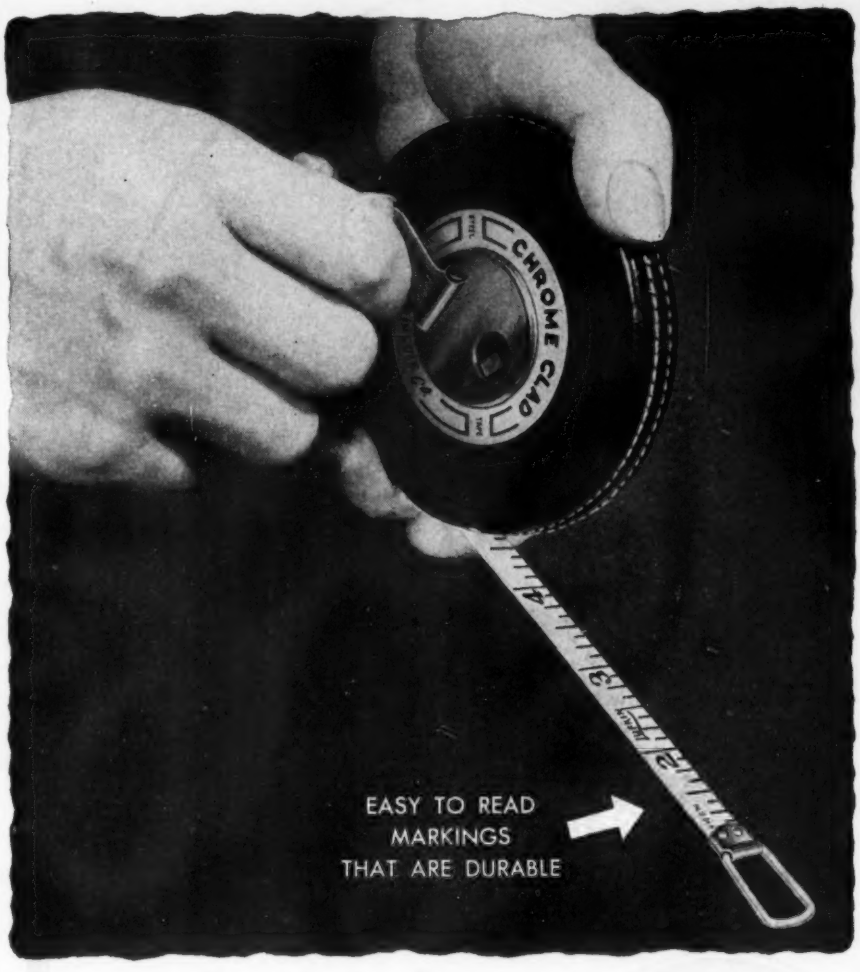
HOW TO SPEED UP SETTLEMENT OF YOUR TERMINATED WAR CONTRACT—*By J. K. Lasser. Published by the McGraw-Hill Book Company, 330 West 42 Street, New York 18, N. Y. 186 pages. $3.50.*

War contractors who have been horrified by voluminous rulings and regulations on contract settlement issued by various government agencies will welcome this concise and easy-to-read book on this serious reconversion problem. The author has done as good a job in boiling down the complex termination questions as he accomplished in previous best-seller books on filling out income tax forms.

Contractors, subcontractors and suppliers are treated separately, as they are taken through the various steps in a contract termination, with their responsibilities and rights outlined. Brief explanations of the termination steps are offered, instead of the involved legal terminology usually found in termination procedure manuals. The various termination forms that must be filled out are reproduced with specific page references for explanations on how to fill out each entry.

Typical sections in the book are headed: "How to figure what is due you after termination"; "How you

THESE TAPES ARE BUILT TO TAKE IT!



LUFKIN "ANCHOR" CHROME CLAD STEEL TAPES

Drag it—scuff it—twist it—you can't hurt the Lufkin "Anchor" Chrome Clad Steel Tape. It's a great favorite with mechanics everywhere, because it's made to stand up dependably under rough-and-tough handling. The line is extra strong, built up by plating and covered with the chrome "life jacket" that will not crack, chip or peel. Jet black markings recessed below this non-glare surface are easy to read—and they're permanent. Hook-ring available at slight extra cost permits one man measuring. Genuine leather case, handstitched. For the best steel tape made for general measuring work, see the "Anchor" at your dealer's. Write for free catalog. THE LUFKIN RULE CO., SAGINAW, MICHIGAN, NEW YORK CITY.

LUFKIN FOR ACCURACY

. . . are hitting the target!

We don't know how many plug gauges laid end to end it would require to reach Tokyo, but we do know that we made 3,286,212 steel and chrome plug gauges to check many types of war implements that do reach our military objectives.

Yes, *precision* has become the watchword of industry during this war, and it will continue to be a factor in those industries that will be the leaders in peacetime production.

★ Remember the name Turner when you think of Precision.

TURNER BROTHERS

TURNER GAUGE GRINDING COMPANY
2625 HILTON ROAD • • • • FERNDALE, MICH.

Types of Gauges we make

Cylindrical Plug Gauges, Plast-O-Lock Plug Gauges, Cylindrical Ring Gauges, Special Flush Pin Gauges, Solid Type Snap Gauges, Master Discs, Built Up Gauges

can move and store inventory"; What a T-Loan is and how you can get it"; "How you can appeal from the government's findings"; "Your tax problem after a termination settlement."

•

NEW METHODS FOR SHEET METAL WORK—By *W. Cookson, M. Inst. Met., A.M.I. Prod. E., first-class finalist, Metal-Plate Work City and Guilds of London Institute. 205 pages. Third edition, revised and enlarged. Published by The Technical Press Ltd., Gloucester Road, Kingston Hill, Surrey England.*

This third and enlarged edition is designed to assist the technical advancement of the sheet metal working industry. It presents detailed information on conventional methods of pattern development with particular emphasis on several new and simple techniques which should be useful to craftsmen.

The author expounds his own system of triangulation, developed by practical methods and rigorously tested in many applications. Two chapters are devoted to a description of the layout system, and the thoughts propounded are illustrated. Applications of the triangulation system are given.

Technicians and skilled manual workers will undoubtedly find this book helpful in solving many of the every-day problems connected with pattern development.

TO THE EDITOR

DEAR EDITOR:

Industry in general, and the welding industry in particular, are and have been greatly handicapped by the lack of a real technical standard covering electrodes. True there have been in existence for some years a so-called standard which actually might be termed a "buyers' guide" and is known as "Tentative Specifications" published by A.W.S.

However, even in this long and complicated "buyers' guide" there are so many discrepancies with ambiguous and contradictory statements that it is rendered entirely unsatisfactory. Let me cite a few examples.

To qualify any electrode for any classification, the tests are so complicated and so costly as to render them useless in manufacturing practice. They are too costly to be repeated

COMPARE the prices of Standard Carboloy Tools with those of ordinary tools

. . . then compare results

★ Available at prices as low as 70c each—actually lower in price than many sizes of ordinary tools—Carboloy "Standards" are a *"must"* on any tooling program!

Compare the prices of Carboloy "Standards"—then compare the *recognized* results of their use! With Carboloy "Standards" you can quickly increase production, often doubling or tripling machine output; save machines and manpower; reduce your tool inventory; step-up tool life to unprecedented periods of continuous use; obtain a quality of finish that substantially reduces polishing time; and effect a marked reduction in cost per piece produced.

These outstanding advantages are *immediately* available to you when you specify Carboloy "Standards". Stocked for prompt delivery in 10 styles, all common sizes, for cutting steel, cast iron, non-ferrous and non-metallics.

CARBOLOY COMPANY, INC.
11149 EAST EIGHT MILE ROAD DETROIT 32, MICHIGAN
CHICAGO • CLEVELAND • HOUSTON • LOS ANGELES • MILWAUKEE
NEWARK • PHILADELPHIA • PITTSBURGH • THOMASTON
Also Sold by Leading Mill Supply Distributors

CARBOLOY
(TRADE-MARK) CEMENTED CARBIDES
STANDARD TOOLS

Increased Production!
•
Machines and Manpower Saved!
•
Long Tool Life!
•
Better Finish!
•
Lower Cost per Piece!
•
Lower Tool Inventory!
•
Improved Product Quality!

Send for Catalog GT-175R

Millions of whirling abrasive wheels, trained in war's tough school of precision finishing, each doing a prime job in laboratory, tool room, aboard ship, on production line. And—they're all set and eager to tackle civilian goods when peace machinery is singing again.

Whether it's removing burrs, smoothing edges, squaring surfaces so accurately that the finish can be measured in micro inches, or cut-off work—there's a Chicago ready to do a top-ranking job for you.

VITRIFIED GRINDING WHEELS with a 50-year pedigree. Up to 3" in diameter in various abrasives and bonds including the famous FV Bond.

MOUNTED WHEELS. The largest assortment made with a shape and abrasive to take care of every internal and external finishing job.

CUT-OFF WHEELS. All types and sizes. Now offered with the sensational new special-formula RT Bond (rubber or resinoid).

SEND FOR TEST WHEEL—Learn first-hand about Chicago's superiority. Tell us what you have to finish, size wheel you'd like and we'll mail one promptly.

SEND COUPON FOR ILLUSTRATED CATALOG

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe St., Dept. AT **Chicago 7, Ill.**

**Half a century of specialization has established our reputation as the Small Wheel People of the Industry.*

Send Catalog. Interested in ☐ Grinding Wheels ☐ Mounted Wheels ☐ Cut-off Wheels ☐ Send Test Wheel. Size .....

Name .....

Address .....

periodically as a check on manufacturing standards.

Tests are required on all sizes of 5/32 in. and above, but note that no tests are required on ⅛ in. and smaller so why have tests on *each* larger size? A manufacturer cannot use the same electrode for two or more classifications; this in spite of the fact that the ideal electrode, of course, is one which would fulfill all classifications.

Then there are specifications as to the electrical resistance of the coating which certainly has nothing to do with the performance of the electrode. Also it says:

"The coating shall not have scabs, blisters, abnormal pockmarks, bruises or other surface defects that shall be injurious."

Just what is injurious?

These are only a few of the idiosyncrasies of this "buyers' guide." Therefore, it can readily be seen that what is needed is a simple, easily understandable standard which would enable a manufacturer to manufacture to such standards consistently and would enable the purchaser to readily and easily test the electrodes if he wished to do so, to see if the manufacturer was conforming to the standards.

Since there is no need for a weld stronger or better than the material to be welded, I suggest for mild steel which covers 90 percent of the requirements, a simple standard something as follows:

"The electrode shall be of such characteristics that it will withstand the following tests to be made any time a buyer might desire:

"1. A weld made in ⅜ in. or ½ in. plate of mild steel, planed to the same thickness as the parent metal, must break outside of the weld when pulled in a standard tension machine.

"2. On a section from the same plate mentioned in No. 1, welds to be bent in any way desired and elongation of 25 percent in the outside fibers must show no fracture."

It is quite evident that an electrode which will perform as indicated in these two tests will give a weld equal in physical qualities to the plate. With such a weld, the matter of porosity is obviously of no consequence. However, if it should be desired to cover the question of porosity, a simple test could be made as follows:

"A fracture shall be made through the weld. On a straight line through the fracture weld there shall be voids of no more than five percent cumulatively."

There is no question but that an electrode which will withstand the

above very simple tests will be satisfactory in welding mild steel, so why complicate matters.

It seems to me that this is a question to which the Filler Metal Committee of the American Welding Society, 33 West 39 St., New York City, should give proper attention.

Yours very truly,
The Lincoln Electric Company,
J. F. Lincoln, *President*

SEEN and HEARD

By JOHN R. GODFREY

"Upside Down" Turning

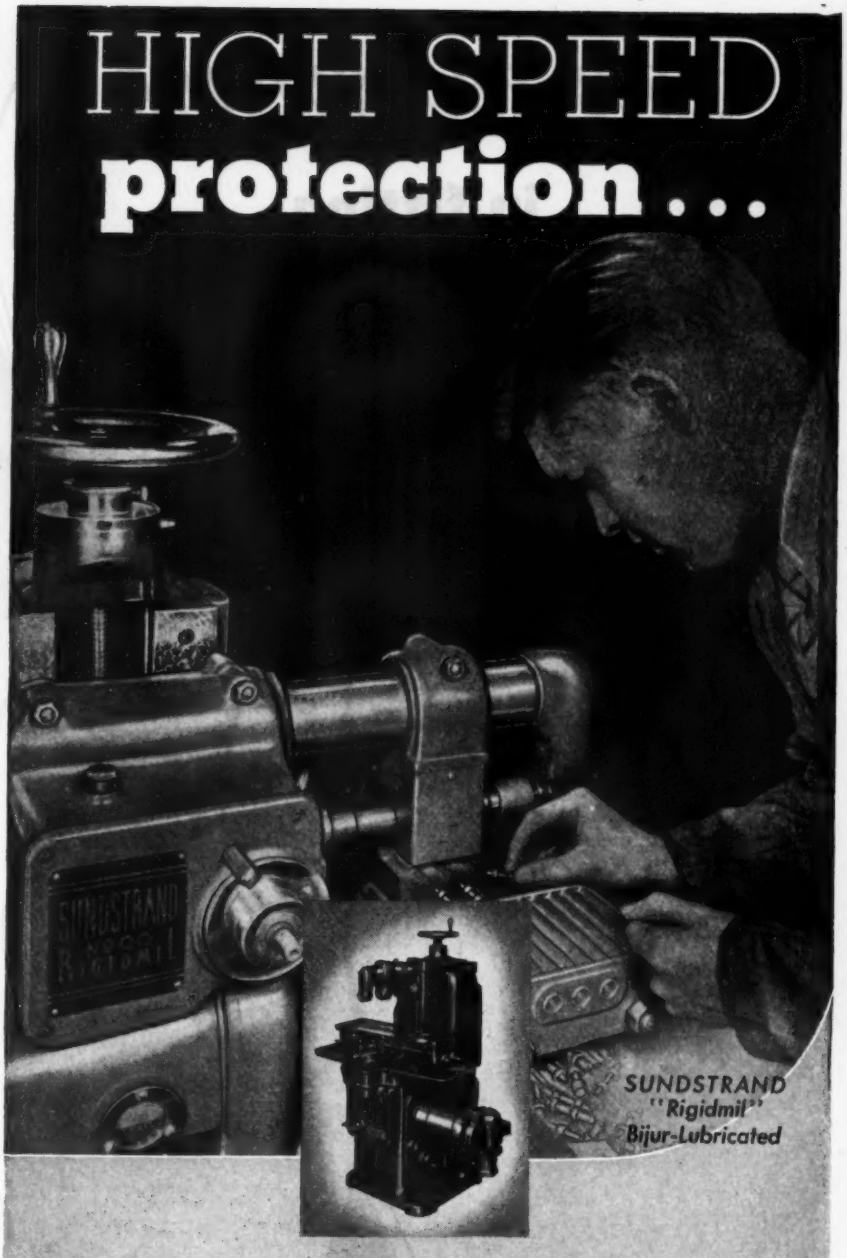
I HAD ALWAYS supposed that "upside down" turning—that is having the lathe run backwards and the cutting edge of the tool pointing down, was exclusively Japanese practice. I saw it in many shops in the land of the rising sun back in 1929. I also found where in some cases chucks and faceplates had been backed off the lathe spindle by this process.

The practice has, however, reached some shops in this country. In an ordnance shop making 155-mm. guns several lathes use the same "upside down" practice. Inquiry brought the information that there was less likelihood of chatter. If this is true and not imagination, it would seem to indicate that the lathe spindle bearings needed attention. For while the tool cutting in the usual way does tend to lift the work, the weight of a 155-mm. gun should counteract any "lift" on finishing cuts, as was being done. Roughing cuts were made in the usual manner.

Importance of Surface Finish

SURFACE FINISH is open to many interpretations. Years ago when a "boiler-maker's hair" was a quarter-inch and a "Pittsburgh finish" was a "high polish and a deep scratch" we had no standards of surface measurement. Appearance, such as polish, or a thumbnail test for roughness, were about our only means of selecting finish. Today we have Profilometers, Brush Analyzers and talk of microinches, which are millionths of an inch.

With highly stressed members, a single deep scratch may provide a starting place for a crack and failure of an important part, as the connecting rod of an airplane engine. On the other hand a rough surface finish on an 8-in. shell



■ With industry geared to a constantly increasing tempo, high production rates must be maintained over long periods of time. Long runs, multiple shifts, extended hours . . . these and other emergency conditions make efficient lubrication all the more essential. BIJUR automatic "metered" lubricating equipment is doing its part in assuring quality production at top speeds.

BIJUR LUBRICATING CORPORATION, LONG ISLAND CITY, N.Y.

BIJUR
AUTOMATIC *Metered* LUBRICATION

SAVE SUPERVISION
in fitting
PRECISION PARTS

YOU PROBABLY KNOW Laminum shims as assembly time savers. But have you overlooked the fact that in fitting machine parts by peeling these precision laminations, considerably less supervision is required. You have the certainty of uniform accuracy . . . with no spoilage. Your request for data invited.

Laminum shims are cut to your specifications. For maintenance work, however, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated
50 Union Street • Glenbrook, Conn.

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

2221

hinders its flight from the gun and lessens its effective range. Variations in roughness on shells in the same batch affect their accuracy in hitting a given target. So surface finish plays its part even on shells and shows the advantage of uniformity in finish.

When superfinish became popular the Army had some shells finished by this method presumably to test the effect on flight, and possibly to see if it was easier on the bore of the gun barrel. Presumably the test results are among the articles of the Ordnance Department.

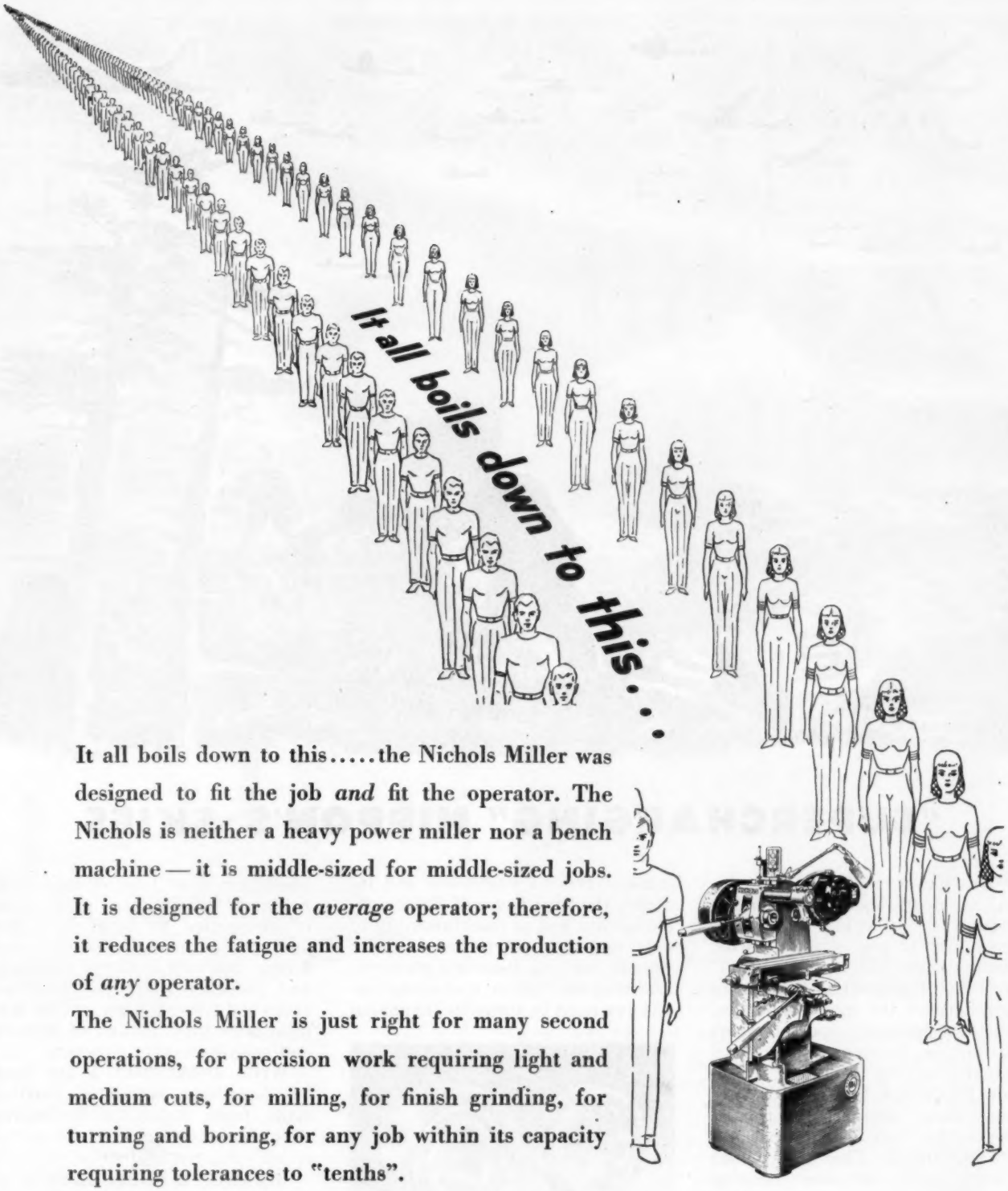
Superfinish would hardly be practicable for the millions of shells used by our artillery and other guns. But it might be advisable to aim for a *uniform* finish so as to increase the effectiveness of artillery fire. On some large shells the limit is 500 microinches and on small shells only 50 microinches. But as a better finish would not cause rejection, the same batch might include finishes of from 50 to 500 microinches. This would affect the firing range to an appreciable degree. So even on shells surface finish must be considered.

B. A. Taps, Dies and Gages Require Metric Pitch

BY C. A. REIMSCHISSEL
Director of Dieheads,
Landis Machine Company

THERE IS some confusion regarding the proper pitch for taps, dies and gages required for the British Association thread. For example, in respect to the No. 4 thread, some people ask for chasers made with 38.5 threads per inch; others try to inspect a properly cut screw with a gage made with this number of threads per inch. Actually, the basic formula for pitch is $p = 0.9^n$, where p is in millimeters and n is the number designating the screw size. For a No. 4 thread, a lead error of 0.00554 in. per in. is introduced, when pitch conforms to a 38.5 threads per in.

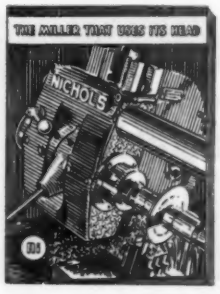
Such errors are brought about by referring to published tables which neglect to state that the equivalent pitch in inches and the number of threads are only approximate. And even the British Institute Standard sheet No. 93—1919 gives the metric pitch to only two significant figures. Most B. A. threads are used in aircraft work. Interchangeability can only be secured if threading tools and gages are made to the same basic entity—the calculated metric pitch.



It all boils down to this.....the Nichols Miller was designed to fit the job *and* fit the operator. The Nichols is neither a heavy power miller nor a bench machine — it is middle-sized for middle-sized jobs. It is designed for the *average* operator; therefore, it reduces the fatigue and increases the production of *any* operator.

The Nichols Miller is just right for many second operations, for precision work requiring light and medium cuts, for milling, for finish grinding, for turning and boring, for any job within its capacity requiring tolerances to "tenths".

If your precision work requires short cuts, it requires Nichols precision and speed.



This new catalog on the Nichols Miller is free for the asking.

THE *Nichols* MILLER

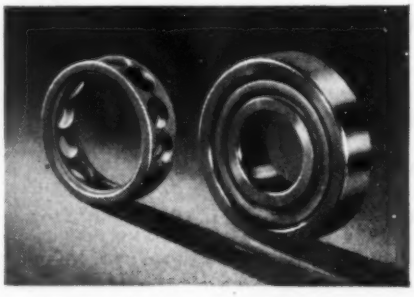
MANUFACTURED BY W. H. NICHOLS & SONS, WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 40 CHURCH ST., NEW YORK 7, N. Y.

"SUPERCHARGING" NIPPON'S SKIES

BEFORE THE BOEING B-29s' first mission, engineers had to conquer the stratosphere — enable the giant planes to fly at glacial altitudes for gruelling hours. The "secret weapon" that solved the problem is a turbo-supercharger. Its most important component parts are super-precision anti-friction bearings mounted in laminated plastic retainers. Made from BAKELITE laminating varnishes, these retainers function at exceptionally high bearing speeds—up to 30,000 r.p.m. They also operate at temperature extremes, ranging from 350 deg. F. to 60 deg. below zero.

Laminated plastics based on BAKELITE resin varnishes give designers, product engineers, and industry the advantages of dimensional stability and of machineability to extremely close tolerances. Light in weight, high in dielectric strength, low in oil absorption, and exceptionally resistant to abrasion, laminated plastics in sheet, tube, and rod form, bring an outstanding combination of properties to such diversified products as gears, electrical coil forms, aircraft pulleys, fairleads, and propeller supports, telephone, radio and television equipment, hospital table tops, industrial helmets, and countless other products.



Write Department 1 for booklet describing laminated plastics, made from BAKELITE laminating varnishes.

TRADE (B) MARK

BAKELITE CORPORATION
Unit of
Union Carbide and Carbon Corporation
UCC
30 EAST 42ND ST., NEW YORK 17, N.Y.

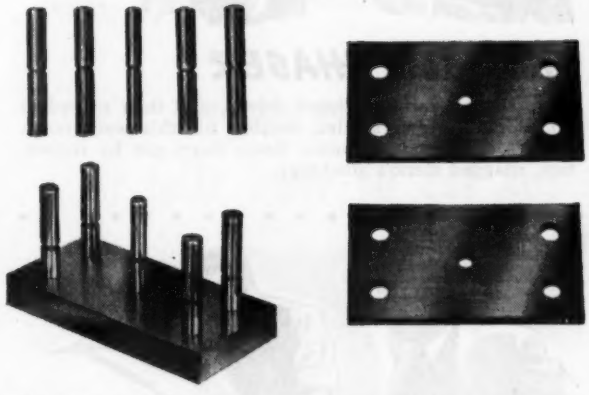
BAKELITE LAMINATING PLASTICS

TRADE-MARK

4 Hole Grinding Problems { CAN YOU ESTIMATE THE TIME?

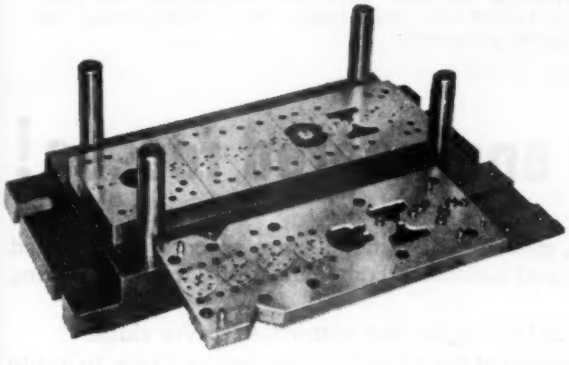
TWO-STATION DIE BLOCK

All holes ground to exact size and location. Blank hole and center piercing hole ground with one half degree included taper. Little clearance permissible between punch and die. *2¾ hrs. on the Moore Jig Grinder.*



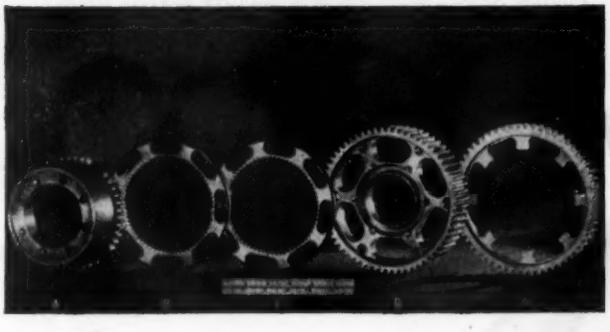
TEN HOLES IN MASTER PLATES

Hardening distortion corrected in two plates. Ground to size and location *independently* and to plug gage fit in any of the four possible positions. *3½ hrs. on the Moore Jig Grinder.*



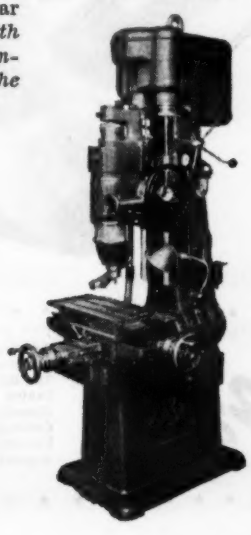
TEN-STATION DIE

100 holes located and ground to .0002" tolerance in hardened die and stripper inserts. Die parts, four stripper inserts, two cutting punches and shaving punch ground in 50 *hrs. on the Moore Jig Grinder.*



FIVE ACCESSORY GEARS IN MASS-PRODUCTION

Gear A: Eight holes on circle ground to size and location within ±.0003"...*Gears B, C, D, E:* Radii at ends of elongated pockets ground to size and location within ±.0003"...*Gears B, C:* Radii ground to shoulder near bottom of pocket within ±.0005". *With special indexing fixture, 4 aircraft engine gears per hour finished on the Moore Jig Grinder*



"Correcting Hole Location Within Less Than .0001" is the title of our new 28-page catalog which describes the operation and applications of the Moore Jig Grinder to dies, drill jigs, gage parts, master plates and production parts. Write for your copy today.
MOORE SPECIAL TOOL CO., INC. • 738 UNION AVENUE, BRIDGEPORT 7, CONN.

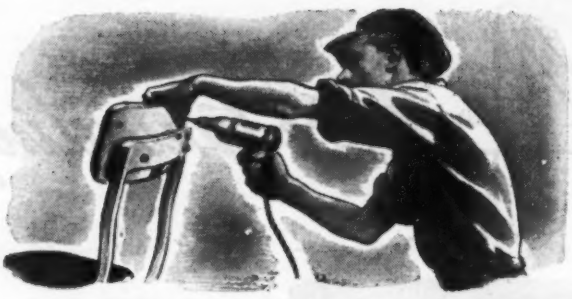
MOORE TOOLS

Moore Jig Grinder

THE ONLY MACHINE OF ITS KIND

TROUBLE CHASER!

Even though carefully hand driven, and then smoothed up, slotted screws spelled trouble for this well-known typist's chair manufacturer. Some burrs got by inspectors, snagged steno's stockings.

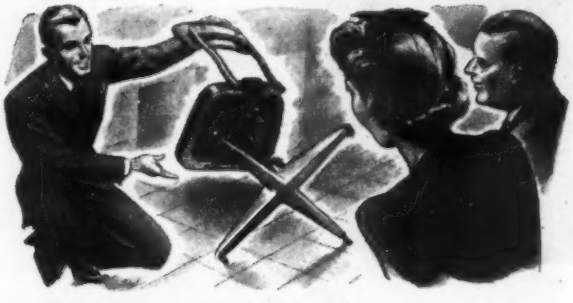


OUTPUT PACER!

Better still, workers freed of the dangers of finish-scarring driver skids, boosted output plenty with fast power-driving.

FUTURE FACER!

Because they are engineered to take top driving pressures, Phillips Screws help designers improve product strength and rigidity. With stronger, tighter fastenings, any product is in better shape to meet coming competition.



ORDER PLACER!

At the point-of-sale, the Phillips Recess' eye-appeal will help to get the order. Burr-free, blending with any product's beauty – it's the finishing touch that softens the toughest prospects!

It's Phillips ... the engineered recess!

In the Phillips Recess, mechanical principles are so correctly applied that every angle, plane, and dimension contributes fully to screw-driving efficiency.

... It's the exact pitch of the angles that eliminates driver skids.

... It's the engineered design of the 16 planes that makes it easy to apply full turning power – without reaming.

... It's the "just-right" depth of recess that enables Phillips Screw Heads to take heaviest driving pressures.

With such precise engineering, is it any wonder that Phillips Screws speed driving as much as 50% – cut costs correspondingly?

To give workers a chance to do their best, give them faster, easier-driving Phillips Recessed Head Screws. Plan Phillips Screws into your product now.

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

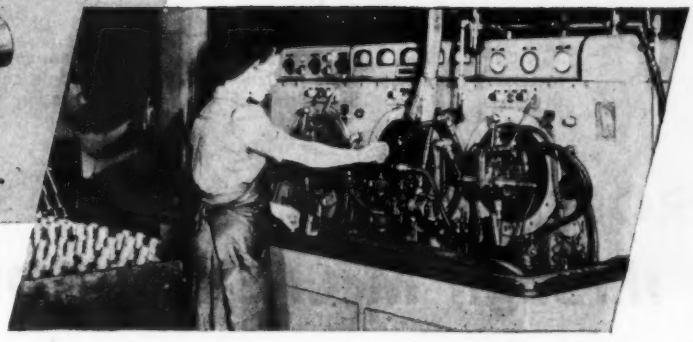
Made in all sizes, types and head styles

25 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
The Steel Company of Canada Ltd., Hamilton, Canada
Wolverine Bolt Co., Detroit, Mich.

Double-Barrelled SHORT-CUT

Briggs and Stratton tells how to cut costs ...improve quality with



Part: Engine gear and shaft. Pitch diam. of gear 2", face 5/8". One of 18 parts which are hardened by Briggs & Stratton Corp. on one TOCCO machine.

Short-cut No. 1. Formerly hardened gear blank to machinable limit (32 R.C.) and cut teeth when hard . . . Now cut teeth in soft gear blank and TOCCO-harden teeth to 40-45 R.C. . . . Results: Gear-cutting is faster because metal is soft. Gear life is increased because of greater hardness.

Short-cut No. 2. Formerly press-fitted gear on shaft as separate operation . . . Now TOCCO shrink fits gear on shaft simultaneously with TOCCO-Hardening of gear . . . Result: Eliminates an operation.

TOCCO does the entire hardening and shrink-fitting operation in 15 seconds. Absence of scale and distortion makes the part perfectly accurate and uniform . . . ready for assembly.

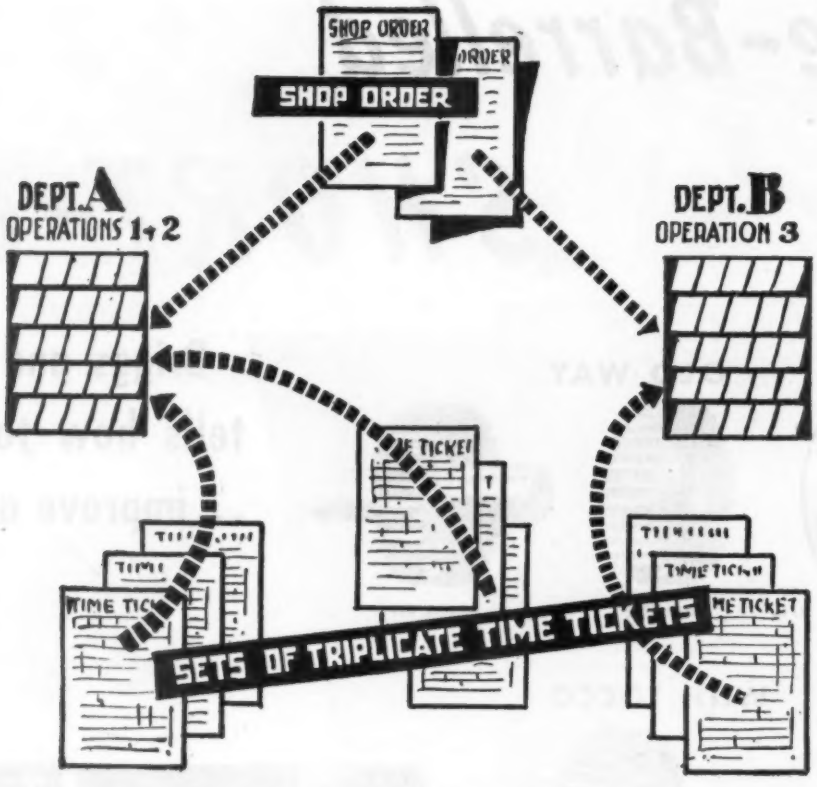
The TOCCO machine, clean, compact and devoid of radiant heat and hot gases, is located in the center of the machine shop handy to machining operations.

TOCCO Engineers will gladly help you develop similar improvements in your metal working production. "Results with TOCCO," Bul. 14, free on request.

THE OHIO CRANKSHAFT COMPANY · Cleveland 1, Ohio

TOCCO

HARDENING . . . BRAZING
ANNEALING . . . HEATING
★



This Chart is one of a series of eight suggesting how various elements of control are secured through McCaskey Systems by the visualizing and flow of multiple copies of a few forms that are already in use in most plants. The charts will suggest how McCaskey Control will meet your particular needs.

PRODUCTION CONTROL *for* LOWER COSTS *through* McCASKEY CONTROL SYSTEMS

The period immediately ahead again challenges the ingenuity of production men. The "money-no-object" days of forced production are gone. Cost reduction now commands attention.

Effective production planning and control will reveal numerous means of cutting expense. Simplification of the control system in use frequently is one of them.

We have charted the ABCs of McCaskey Production Control to show how easily various elements of control may be combined to provide complete control, according to the particular needs of individual plants or departments. The chart above, for example, illustrates one of the procedures described for machine loading, scheduling and dispatching.

Send at once for

Your copy of "The ABCs of Production Control." A wide range of systems applications is visualized simply and clearly to show how McCaskey Controls operate. One of the systems outlined or an adaptation of it will fit your specific requirements. WRITE FOR YOUR COPY TODAY.

A McCaskey industrial representative, qualified by training and experience, is available to help you analyze your requirements and suggest the McCaskey Control that will best meet them. No obligation, of course.

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Ontario, Canada — *The McCaskey Register Co., Watford, England*

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

YES, correct for cleaning up both bottom and sides of beveled grooves is this "wheel" type Nicholson Cylindrical Shape Double Taper Rotary File. Though the action above shows the Hand Cut type, this shape is also made in the Ground type (see comparative cuts in the typical Nicholson Rotary Files illustrated at the right).

The Cylindrical Shape Double Taper is also used to clean out large gears; and in the aircraft industry where, in the *Ground* type, it is widely used for work on cylinder head fins which may have been damaged in the casting process, or to smooth down and blend out fins which may have broken out.

The uses of Nicholson Rotary Files, in their various shapes, diameters and degrees of coarseness, are almost legion. They're fast-working, time-saving, problem-solving. . . . And bearing the Nicholson trade-mark of quality, they assure everything to be desired in the way of trueness, proper cut, expert hardening—and fine high-speed steel.

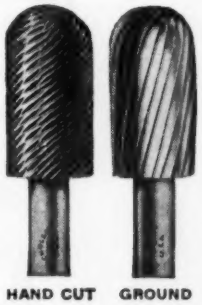
WRITE FOR CATALOG AND PRICE LIST—and for any special information you desire. For deliveries, consult your mill-supply house.

NICHOLSON FILE CO. • 97 ACORN STREET, PROVIDENCE 1, RHODE ISLAND

(In Canada, Port Hope, Ont.)

16 STANDARD SHAPES

(In either Hand Cut or Ground). 3 cuts—Coarse, Medium, Fine. Stock diameters—1/8" to 1 1/8".

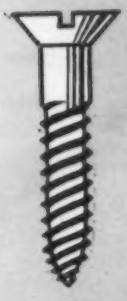


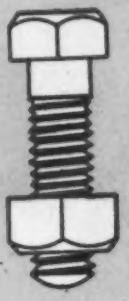
HAND CUT GROUND

NICHOLSON ROTARY FILES

HAND CUT AND GROUND • *FOR EVERY PURPOSE*

NICHOLSON U.S.A. MADE IN U.S.A.





You Name it They Drive it

● WOOD SCREWS ● MACHINE SCREWS
● SELF-TAPPING SCREWS ● NUTS AND BOLTS

Black & Decker Electric Screw Drivers and Nut Runners speed up practically every type of assembly work . . . from the most delicate screw driving operations to driving and tightening nuts and bolts up to 1" diameter or lag screws up to ¾" x 6".

Light, compact and easy to handle, as well as powerful and dependable, these Black & Decker Power Drivers assure top-speed production with greater accuracy and uniformity, with fewer rejects under inspection and with a minimum of operator strain and fatigue.

Three of these time-saving, cost-cutting assembly tools are shown on the opposite page . . . and full information about all models and their many applications is given in our 60-page illustrated "Power Assembly Tool Data Book." For a free copy address: The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Maryland. For help on any tooling problem, see your nearby Black & Decker Distributor.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

Positive Clutch "SCRUGUN"* . . . $47
Designed for versatility. Drives wood screws up to #10 x 2", self-tapping screws up to #12, machine screws and nuts up to ¼" diameter. Positive clutch lets free spindle idle until operating pressure engages jaws. Weighs 3½ lbs. Measures 8¾" overall.

Adjustable Clutch "SCRUGUN" . $57
Designed for uniform production. Adjustable clutch automatically drives every screw to uniform tension . . . then releases spindle. Drives self-tapping screws up to #12 or machine screws and nuts up to ¼" diameter. Weighs 3¾ lbs. Measures 10¼" overall.

90° Angle Drive "SCRUGUN" . . $77
Designed for work in close quarters and around corners. Has adjustable clutch. Angle head transmits full power to spindle. Drives self-tapping screws up to #12 or machine screws and nuts up to ¼" diameter. Weighs 4½ lbs. Measures 10¾" overall.

*Trade Mark Reg. U.S. Pat. Off.

CM

68 Years of experience really means something

HOISTS

COMET light weight electric hoist. Capacities from ⅛th to 1 ton.

METEOR heavy-duty electric hoist. Capacities from ½ ton and up.

CYCLONE 12 bearing high speed hand hoist. Capacities from ¼th ton and up.

Since 1876 Chisholm-Moore has been providing industry with many types of overhead materials handling equipment. These years of experience combined with "service-thinking" engineering skill are reflected in the operating efficiency, durability, economy and safety features of all CM materials handling equipment.

Hand Chain Hoists, Electric Hoists, Monorail Trolleys, Traveling Cranes, CM Puller (for horizontal pulling) and other CM equipment are fully illustrated and described in Catalog 1944. You'll find the information most helpful. Write us today for a copy.

CHISHOLM-MOORE HOIST CORPORATION

(Affiliated with Columbus-McKinnon Chain Corporation)

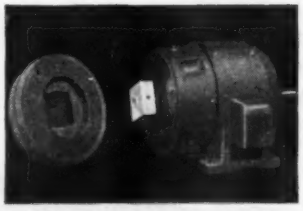
GENERAL OFFICES AND FACTORIES: 128 Fremont Ave., TONAWANDA, N.Y.

SALES OFFICES: New York, Chicago and Cleveland

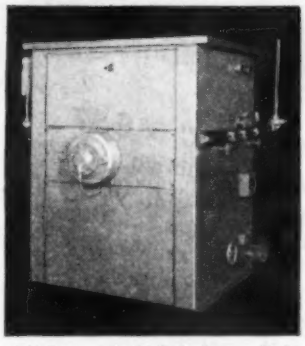
THE NEW JLE PNEUMATIC DISK BRAKE

SMOOTH-OPERATING, EASILY ADJUSTABLE, TROUBLE-FREE

FOR USE WHEREVER **QUICK, SMOOTH-STOPPING** IS REQUIRED



JLE Pneumatic Disk Brake showing simplicity of mounting on any double shaft extension motor or other rotating machinery



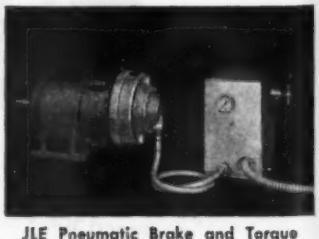
JLE Pneumatic Disk Brake applied to main shaft of Automatic Reeling Unit

SIMPLY CONSTRUCTED, the new JLE Pneumatic Disk Brake is about one-half the size of comparable electrically operated disk brakes, yet has a braking torque four to eight times greater. No lubrication is required on the JLE Brake, maintenance costs are practically nil, and no adjustment is needed during the life of the friction disk. Easily mounted on a motor or rotating shaft extension, the JLE Brake *can be controlled from any electrical or mechanical stop motion device* and requires only 1/40 cu. ft. (or less) of free air per operation. The brake is made in single, double and triple disk sizes, with 100, 200 and 300 lb. ft. torques respectively. JLE Brakes will operate at pressures up to 125 lbs. p. s. i. for use on N. E. M. A. Brake Frame Motors and on any other rotating machinery.

JLE PNEUMATIC DISK BRAKE WITH JLE ADJUSTABLE TORQUE CONTROL UNIT

A compact, high-torque, low-cost control unit designed to permit instantaneous adjustment of braking torque from any remote position without change of brake adjustment.

Send for complete details and specifications to Church St., Pawtucket, R. I.



JLE Pneumatic Brake and Torque control unit

JAMES L. ENTWISTLE CO.

PAWTUCKET, RHODE ISLAND

World's Leading Manufacturer of Spark Testing Equipment

"WE don't care how you do it, but do it and do it quickly, and *make them of Nichrome to be sure they'll work.*"

DRIVER-HARRIS DESIGNS UNUSUAL 52-FOOT MUFFLE

This muffle is 52' long and 15" wide inside. Finish weight is 5000 lbs. Operating temperature is 1800°F in an electric furnace employing a protective atmosphere. Castings of Nichrome, welded into one-piece construction, were used throughout to assure enduring resistance to heat and corrosion.

THAT order called for daring innovations in construction but through the ingenuity of our castings engineers and the vigor of our plan men in tackling the job, these unusual 52-foot muffles were built and delivered in record breaking time. Six muffles are already in use...another is on the way.

Unusual jobs like this one are the "order of the day" at Driver-Harris, so why not bring *your* heat-treating headaches to us. Whether they involve conventional or new applications of heat and corrosion resistant alloy castings, Driver-Harris Nichrome plus Driver-Harris know how will surely solve your problems. Our castings engineers, with 37 years of practical foundry experience, are always at your service

NICHROME is made only by

Driver-Harris COMPANY

HARRISON, N. J.

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco, Seattle

*Trade Mark Reg. U.S. Pat. Off.

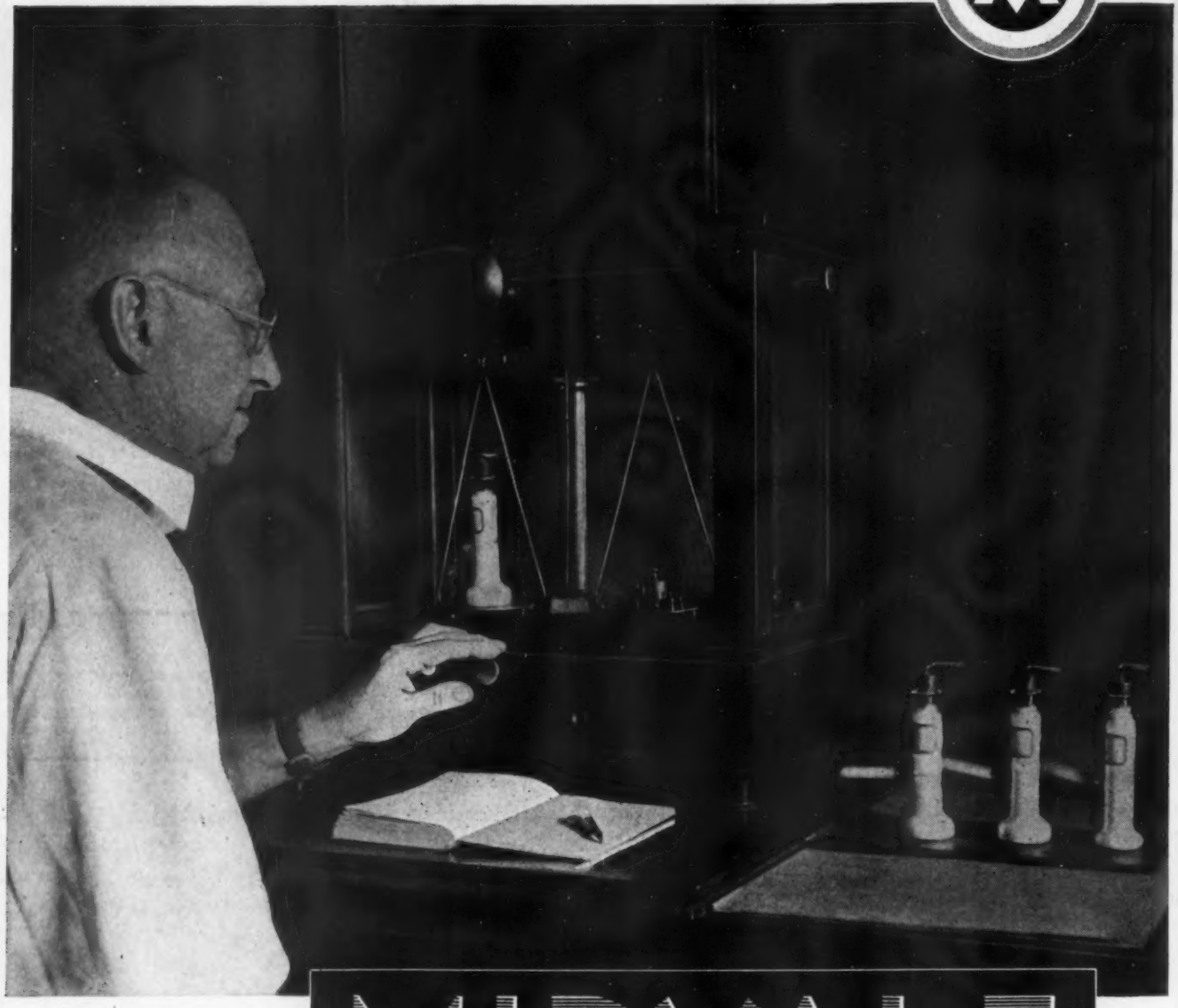
ARMY NAVY

MIDVALOY STAINLESS BARS

Experience accumulated since the first Midvaloy stainless bar was shipped in 1916, is used daily at Midvale in the manufacture of many varieties of heat and corrosion resisting stainless steel bars. All of the common types are made, as well as many special ones. Strictest "nth degree" laboratory control and the great technical skills of our expert staff keep Midvale quality high. Our technicians are available for consultation — and our modern rolling, forging and finishing facilities invite your inspection.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA

OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO



MIDVALE

Custom Steel Makers to Industry

Federal has been making ball bearings for over a quarter century—ball bearings for America's fine motor cars, for trucks, buses and aircraft.

Federals are used in many locations in machine tools, engines and hundreds of other products.

FEDERAL

PRECISION BALL BEARINGS

Federal has produced millions of ball bearings for Uncle Sam's armed forces—for combat planes, ships and mechanized vehicles.

The Federal record of accomplishment, in peace and in war, is undeniable evidence of precision performance. If you seek this same high Quality in the ball bearings you buy—specify FEDERAL.

THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

POUGHKEEPSIE, N. Y.

REPRESENTATIVES LOCATED AT

Detroit: 2640 Book Tower—26 • Cleveland: 402 Swetland Building—15
Chicago: 902 S. Wabash Ave.—5 • Los Angeles: 5410 Wilshire Blvd.—36

These "SPEC'S" belong on your Postwar Plans, too . . .

- MAXIMUM MACHINABILITY
- COLD FORMABILITY
- FREEDOM FROM STRAINS
- HIGH STRENGTH AND TOUGHNESS
- IMPROVED ELASTIC PROPERTIES
- REFINED MICROSTRUCTURE

WYCKOFF SPECIAL FURNACE-TREATED STEELS

The enhancement of these important qualities in cold finished steel is the function of Wyckoff Furnace Treated Steels.

Wyckoff Steel's well balanced heat treating facilities operated under the most rigid controls provide the highest degree of uniformity to constantly maintain these qualities. Treatments set up in accordance with the characteristics of the particular grade of steel best suited to your production needs, can be carried out on production lots with laboratory exactness. Wyckoff engineers will gladly supply factual data on Structure Controlled Annealed Steels.

Works at
AMBRIDGE, PA.
CHICAGO, ILL.
NEWARK, N.J.
PUTNAM, CONN.

WYCKOFF STEEL COMPANY

First National Bank Building, Pittsburgh 30, Pa.
3200 S. Kedzie Avenue, Chicago 23, Illinois

Manufacturers of Carbon and Alloy Steels — Turned and Polished Shafting — Turned and Ground Shafting — Wide Flats up to 12" x 2".

Remember these

FREE-MACHINING MONELS

as your source of STRONG, TOUGH, RUST-PROOF screw stock

"R" MONEL

...for parts not to be hardened by heat treatment

Here's a specially developed grade of Monel you can use in making parts on high-speed automatic screw machines. Aside from its free-cutting characteristics, "R" MONEL provides practically the same mechanical properties and corrosion resistance that have made *regular* Monel so valuable. Its strength is equal to that of the best steel screw stock.

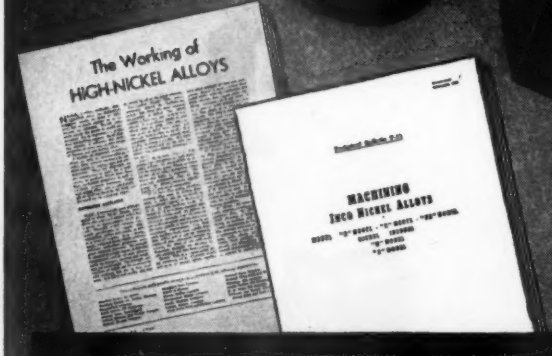
COLD-DRAWN OR HOT-ROLLED
ROUNDS • SQUARES • HEXAGONS

"KR" MONEL

...for parts to be hardened by heat treatment

"K" Monel has long been known for its great strength and hardness. Now you have its *machinable* brother, "KR" MONEL, to use for screw machine parts where a heat-hardenable material is needed to withstand heavy loads. "KR" is your best bet for corrosion resisting parts that must be made extra hard and strong through heat treatment.

FREE-MACHINING "R" AND "KR" MONELS
CAN SAVE YOU TIME AND MONEY!



MACHINING TECHNIQUES for both "R" and "KR" Monel are clearly and fully described in Machining Bulletin T-12. Write for your copy. Handy, too, is the reprint, *"The Working of High-Nickel Alloys."*

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

Gentlemen: Please send me

☐ a copy of Machining Bulletin T-12
☐ a copy of "The Working of High-Nickel Alloys"

Name.....

Duties.....*Title*.....

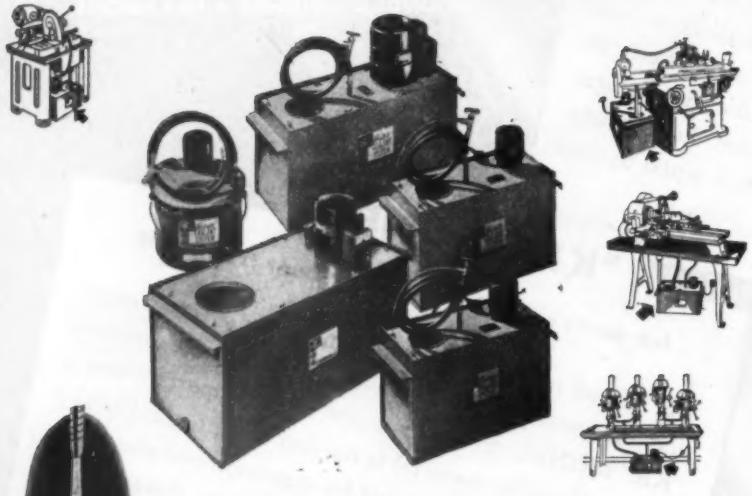
A.M. 7-45

Company.....

Address.....

The oil can's good for a "handy man"... the brush is fine for painting... the drip can is OK for knife sharpeners... *But for coolant applications, you'll get the most out of your machine tools with—*

GRAY-MILLS
Complete Portable
COOLANT SYSTEMS



GRAY-MILLS Coolant Systems provide a simple, economical and efficient method of applying coolants or cutting oils on practically every machining operation . . . in controlled volume, either constantly or intermittently. They are easily installed and can be switched from one machine to another.

Applying coolants in this inexpensive, dependable way to machines not having a built-in-system, results in stepped-up production because it is possible to increase cutting speeds. Longer tool life and improved finish are also direct results from the use of these Gray-Mills Coolant Systems.

Are there operations in your plant where makeshift means for coolant application are being used? Are you getting the most out of taps, drills, milling cutters, etc? Remember you *will* get the *most* out of every machine with a Gray-Mills Coolant System. They are available in a variety of models, with pans and fittings for every requirement. Send for com-

GRAY-MILLS CO.
1953 Ridge Avenue, Evanston, Ill.

GRAY-MILLS

Complete Portable
COOLANT SYSTEMS
FRACTIONAL H. P. PUMPS • PARTS CLEANING SYSTEMS
INDUSTRIAL FLUID REFRIGERATING SYSTEMS

GRAY-MILLS
SUPERFLO
Centrifugal Pumps for coolants—cutting fluids lubricants

• The advanced design and built-in efficiency of Superflo Pumps gives them increased capacity to the point where, a 1/8 H.P. model is comparable in volume delivered to many 1/4 H.P. pumps.

Superflo's integral-streamline design gives compactness, strength and ease of installation. Dependable—service-free in performance, they are ideal for pumping coolants, cutting oils and lubricants, and are easily adapted to any machine. The flow can be regulated from a drip to a full stream without overloading the motor. Capacities from 9 to 44 gallons per minute. Models available for fluids with high abrasive content. There's a Superflo Pump for "superformance" on almost every application... for replacement or as original equipment. Write and tell us your needs.

MODELS FOR EVERY NEED

For submerging in tank, or mounting integrally with cover.

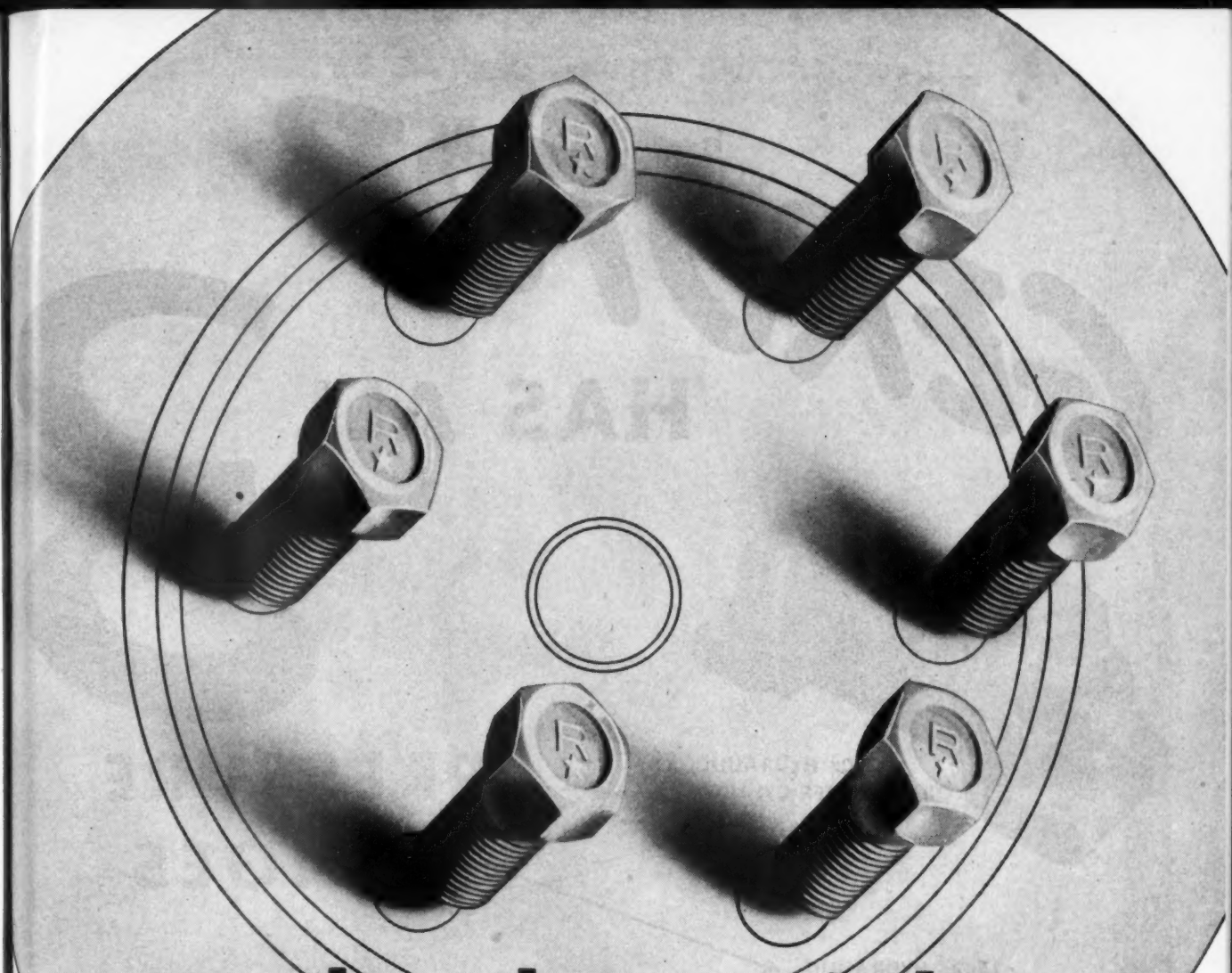
For submerging in tank and mounting to cover.

For submerging in coolant reservoir

For horizontal-external mounting

For vertical-external mounting with inlet through mounting brackets.

GRAY-MILLS CO.
1953 Ridge Ave., Evanston, Ill.



when the auto industry starts rolling

Buffalo Bolt Company is ready for the automotive industry when it shifts into high gear—ready to supply its every need with standard or specially built circle Ⓑ fasteners as we have been doing since the beginning of the "horseless carriage" days.

BUFFALO BOLT COMPANY

NORTH TONAWANDA, NEW YORK
SALES OFFICES IN PRINCIPAL CITIES

Ⓑ One of the modern Buffalo Bolt machines —capacity 4200 pieces per hour.

GEROTOR HAS ALL 3 PRESSURE RANGES

300# HYDRAULIC, OIL OR WATER CYLINDER

1500# HYDRAULIC, OIL OR WATER CYLINDER

3000# HYDRAULIC, OIL OR WATER CYLINDER

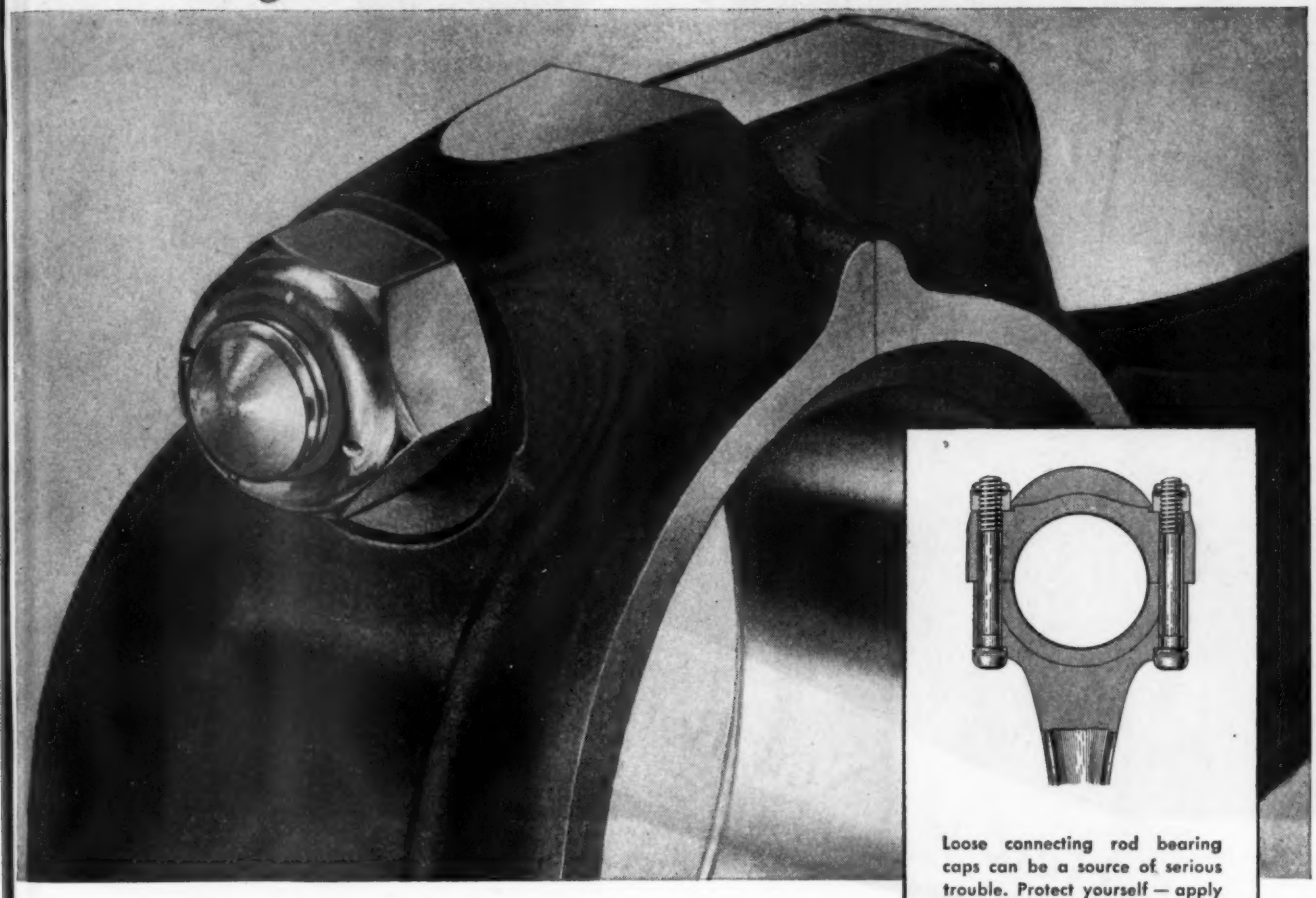
8 MODELS
12 DIAMETERS
ANY STROKE

GEROTOR
AIR and HYDRAULIC DEVICES

LOGANSPORT, INDIANA

GEROTOR MAY CORPORATION • PLANTS—BALTIMORE, MARYLAND • LOGANSPORT, INDIANA

CORRECT *for connecting rods*



Loose connecting rod bearing caps can be a source of serious trouble. Protect yourself — apply Elastic Stop Nuts; they hold fast. This, or any other nut, won't stop bearing wear or bolt stretch, but it can remedy connecting rod troubles resulting from loose nuts.

Make certain that the bolt extends completely through the collar.

LOCKS FAST TO MAKE THINGS LAST

LOCKED ON THE BOLT BY THE ACTION OF THE GRIPPING RED COLLAR.
THE COLLAR IS ELASTIC, THE NUT CAN BE USED TIME AND TIME AGAIN.
MADE IN ALL SIZES AND TYPES — WITH THREADS TO FIT ANY STANDARD TYPES OF BOLTS.

THIS NUT ALWAYS HOLDS FAST

Under tough operating conditions, on connecting rod bearings for instance, the Elastic Self-Locking Stop Nut does its job, by gripping fast. An ordinary castellated nut or jam nut might break loose, lose its grip and fail, and so would the parts it is assigned to hold together.

But not the Elastic Stop Nut. It uses its head—for, built into the head of this nut is a locking device, an oil-resistant elastic compression collar. This forms itself to the individual bolt thread, grips it tight. The nut won't loosen or back off under the severest vibration, shock or impact.

You need no cotter pins, no lock-washers or other auxiliaries when you use Elastic Stop Nuts. Thus there is no possibility of broken bits of these extras in the crankcase. Nor is there any distortion of or damage to the bolt or the cap. Made to fit any standard bolt or stud, Elastic Stop Nuts can be used over and over again with fully adequate gripping power. You can turn this nut up to the exact torque you need and be sure it will stay there.

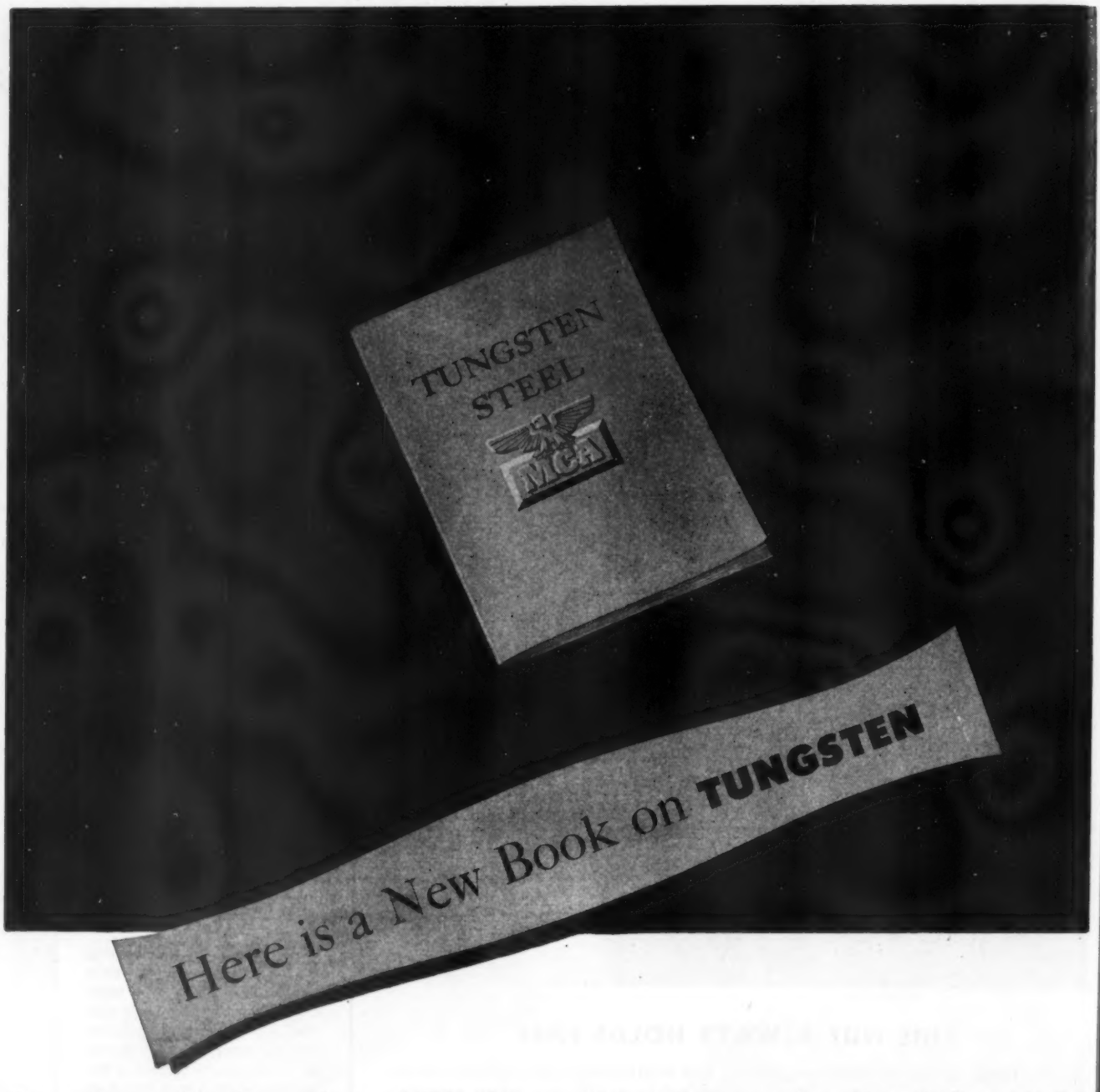
Here is definite insurance against loose bearing caps which means greater safety and reliability in use; greater economy in assembly and maintenance.

ESNA
TRADE MARK

ELASTIC STOP NUT CORPORATION OF AMERICA

Plants at: Union, New Jersey and Lincoln, Nebraska

Sales Office: 1060 Broad St., Newark 2, New Jersey



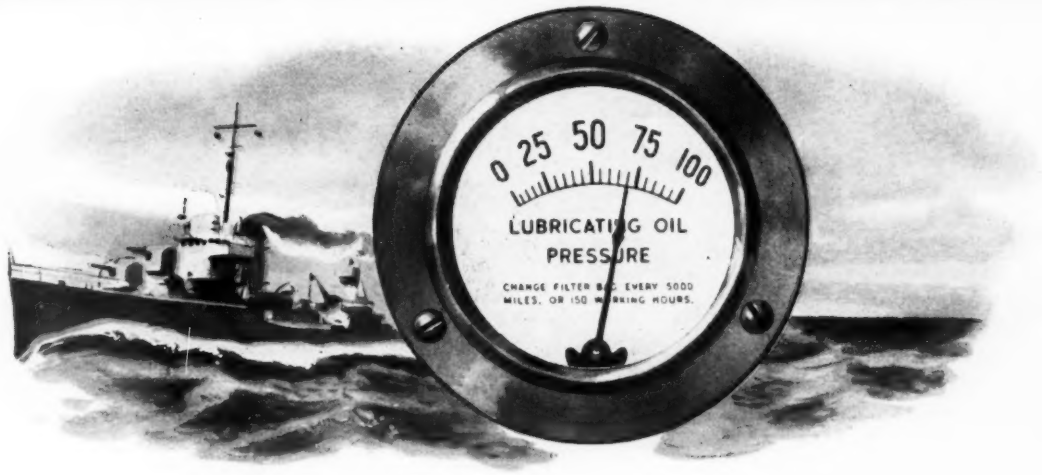
The nature and unique values of Tungsten being what they are, and knowledge of the metallurgical uses of Tungsten having recently advanced so much, the largest supplier of Tungsten to the metal-working industry has been prompted to bring out an authoritative treatise on the subject. The book here offered is believed to answer that description. Both scientific and practical considerations are dealt with, and procedures recommended, for best results. A copy of the book will be mailed on request. Correspondence is invited concerning any use of Molybdenum, Tungsten, or Boron.

AMERICAN Production, American Distribution,
American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit,
Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C.
Donaldson & Co., Los Angeles, San Francisco, Seattle.
Works: Washington, Pa., York, Pa.
Mines: Questa, N. M.; Yucca, Ariz.; Urad, Colo.

MOLYBDENUM

CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA



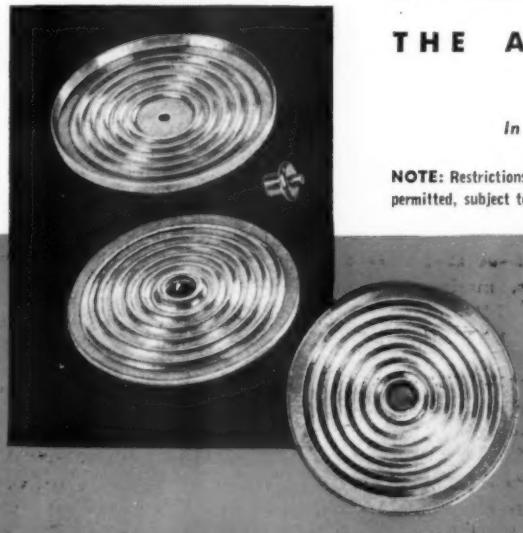
Where gages must resist vibration, high temperature and corrosion

BRASS is the metal . . .

Deep in the engine rooms of destroyers and other Naval craft, diesel engines drive propeller shafts, generators, pumps and compressors. Service demands are severe, with all of the many indicating gages subject to high temperatures, jarring vibration and often to heavy concussion from topside salvos.

Working parts of such gages must resist corrosion and fatigue . . . must be precision-made to retain accurate calibration over long periods of rough usage. That's why Anaconda Brass was specified by "Rochester" for diaphragms and action plates—in the composition, thickness, finish, temper and extremely close tolerances necessary to meet exacting fabricating requirements.

The American Brass Company has had a great deal of experience in supplying Brass and other Copper Alloys in strip, sheet, wire, rods and tubes for gages and other precision indicating and recording instruments. Our Technical Department will welcome the opportunity to work with you in selecting materials most suitable for producing this type of equipment.



THE AMERICAN BRASS COMPANY

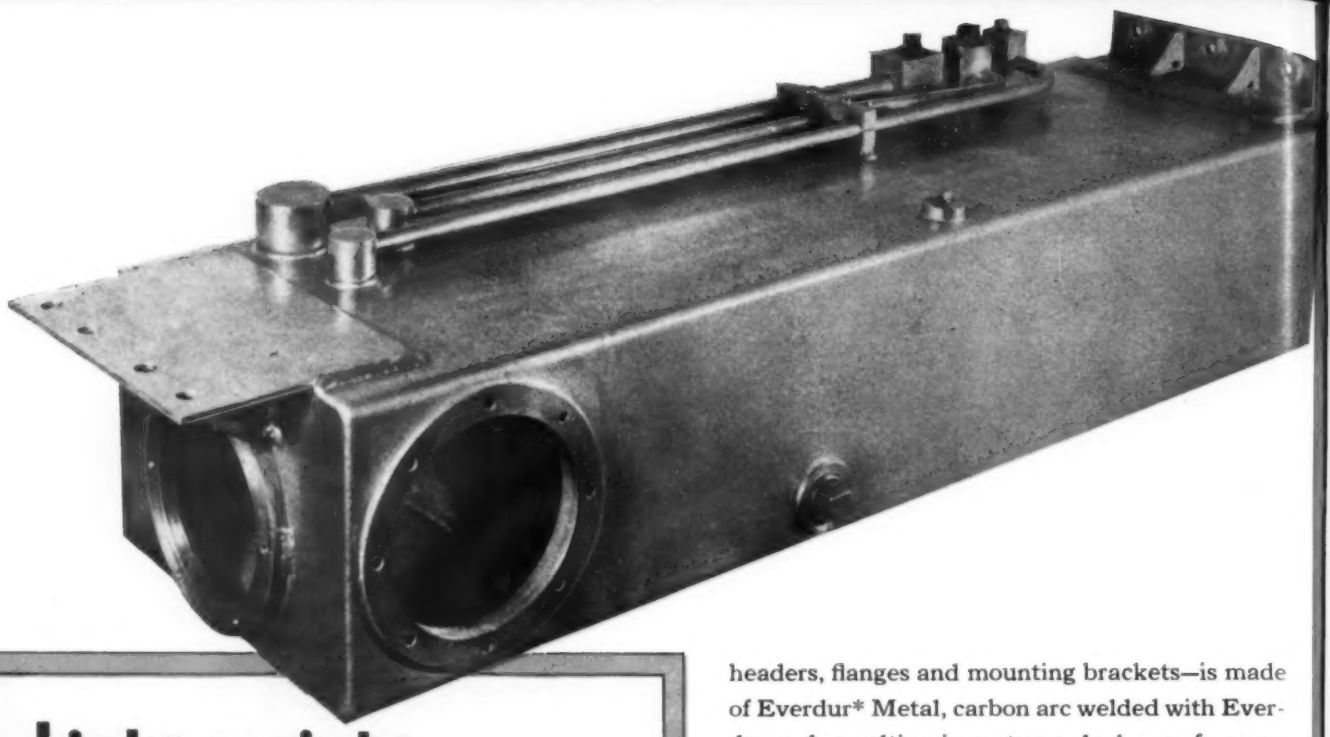
General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

NOTE: Restrictions which have controlled our facilities and products for war purposes have been relaxed. We are now permitted, subject to any continuing requirements of the Government, to resume manufacture for many civilian uses.

Anaconda Metals are used for these important parts in Rochester Pressure and Temperature Gages. Shown at the top of this group is the stamped brass action plate with nickel silver indicating hand. At the left is the heart of the gage—the diaphragm assembly. The corrugated diaphragm is .011" brass, rolled to unusually close tolerances. The corrugated brass backplate, over which the skirt of the diaphragm is spun, is designed to cushion the diaphragm on overload pressures. The diaphragm post is machined from free cutting phosphor bronze.

ANACONDA
from mine to consumer

Anaconda Copper & Copper Alloys



Light weight, strength AND corrosion resistance *in this welded Everdur structure*

This is the main oil tank in the hydraulic control mechanism of a 5" U. S. Navy Gun. These units, 8" x 12" x 40" long, are being built by Alloy Fabricators Division of The Robinson Foundation, Inc., Perth Amboy, N. J. and operate under pressure using oil as the hydraulic medium. The entire assembly—including the body, pipe, pipe headers, flanges and mounting brackets—is made of Everdur* Metal, carbon arc welded with Everdur rod, resulting in a strong, leak-proof, corrosion resistant, lightweight assembly.

Every day new uses are being found for Everdur Metal, The American Brass Company's Copper-Silicon Alloy. And among the reasons are these: Everdur is regularly supplied in compositions suitable for either hot or cold working and is readily fusion welded with rods of similar composition by the oxy-acetylene torch or carbon arc. Furthermore, to facilitate fabrication, Everdur is produced in practically all commercial forms—sheets, strips, plates, wire, rods, bars, shafts, tubes, shells, pipe, hot pressed forgings, casting ingots, drawn shapes and special products. We'll be glad to answer your inquiries on Everdur Metal 45159

* Reg. U.S. Pat. Off.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

Everdur the metal of a thousand uses

PLATING ROOMS—PICKLING EQUIPMENT
Ducts, baskets, drums, drains, dryers, sludge lines, tumbling barrels, wire brushes.

RAILWAY EQUIPMENT—ROUNDHOUSES
Air conditioning and signal equipment, water tanks, electrical conduit, welding rods, train shed skylight frames.

OIL FIELDS AND REFINERIES
Chain, bolts, cable, agitator tanks, electrical conduit, sludge lines.

BRIDGES—ENGINEERING STRUCTURES
Bolts, tie rods, rivets, electrical conduit, bridge plates, framing members.

MARINE FIELD—DOCKS—SHIPYARDS
Fuel tanks, marine hardware, wood and lag screws, bolts, and other forged, cast or machined fittings.

SEWAGE PLANTS—WATER WORKS
Screens, gates, baffles, weirs, filters, frames, tanks, anchors, valve stems.

BREWERIES—DAIRIES
Kettles, vats, filters, screens, hop strainers, wort pans, process tanks and equipment.

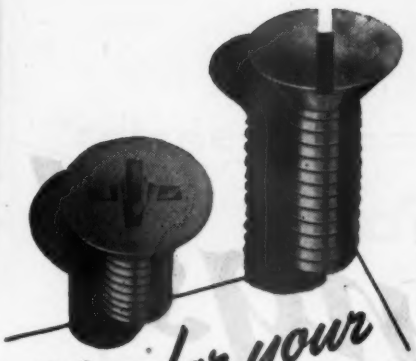
PULP AND PAPER MILLS
Carrying lines, fabricated and welded fittings, screens, doctor blades, save-all pans.

ELECTRICAL EQUIPMENT—HARDWARE
Circuit breakers, screws, bolts, nuts, washers, rivets, studs, clamps, U bolts, eye bolts, turnbuckles, etc.

CHEMICAL AND PROCESS INDUSTRIES
Pipe lines, kettles, stills, welded fittings, valves, unfired pressure vessels, pumps, storage tanks, evaporators.

ANACONDA

Everdur Copper-Silicon Alloy



Also-for your Standard Parts come to CORBIN

Greater accuracy is a *Plus* for industrial buyers of screws and nuts . . . and a Corbin habit, because we are geared to work in tenths . . . but *fast*. That's why even our Standard Machine Screws pass every test for flawless uniformity.

Look to CORBIN

for your requirements in Screws and Nuts . . . a full range in both CORBIN-PHILLIPS and Regular Slotted. Also AIRCRAFT Screws and Nuts to Governmental specifications.

See your Distributor

— also complete stocks at Chicago, New York and New Britain . . . and sales representatives who can "talk shop."

S-13

M³ MEN MATERIALS MACHINES **facilities**

that have made Corbin Headquarters for Precision Parts are producing highest quality Screws . Nuts . Chain.

Look to Corbin for

Standard Parts

Just a minute..

before you open for bids "across the board."

Ask yourself if the blueprints and specifications cover *everything*. For instance, do they cover . . .

1. *Engineering Co-operation:* Production planning that looks behind blueprints and examines *function*. Corbin engineers have often suggested changes and combinations that have improved performance and lowered costs.
2. *Primary Operations:* For instance — could the part start in the cold headers or must it be milled from the bar? Corbin has been highly successful in bringing the advantages of heading to many a "screw machine product" without upsetting cost factors.
3. *Secondary Operation:* You may require such additional refinements as detail finish, plating, special inspection and "kid glove" packing. Corbin can work to precision tolerances in tenths — grind to micro-inch specifications — and hob, grind or roll threads to Class 4 tolerances.

You may save yourself a lot of time — and money — by working with Corbin from the start.

Facilities are explained in this bulletin — which you will find in Sweet's File 4m10 for Product Designers. If you prefer that we send you a copy, please request it on your letterhead.

P-2

THE CORBIN SCREW CORPORATION

The American Hardware Corporation, Successor

NEW BRITAIN CONNECTICUT

CORBIN

See Sweet's Product Design Catalog, outline of Corbin Products and Facilities

Precision Parts

Cut Costs for Ball Bearings!

"Commercials" are good ball bearings, moderately priced. Strong, rugged, durable.

"Commercials" are available in standard types and sizes, or made to your specifications. Dependable ball barings for every purpose and any product.

SCHATZ "Commercial" BALL BEARINGS

If you are now planning future production, cut costs, save time, avoid ball bearing troubles with Schatz "Commercial" Ball Bearings.

THE SCHATZ MANUFACTURING COMPANY
POUGHKEEPSIE, N. Y.

REPRESENTATIVES LOCATED AT
Detroit: 2640 Book Tower—26 • Cleveland: 402 Swetland Building—15
Chicago: 902 S. Wabash Ave.—5 • Los Angeles: 5410 Wilshire Blvd.—36

Prelude to a —

perfect assembly

LORD
SHEAR TYPE
Bonded Rubber
MOUNTINGS

YOUR new product looks fine on the drawing table. Drawings don't suffer from vibration. But machines do. Their life is shortened, their production reduced in quantity and quality. And often the damage extends beyond the machine to other equipment, to your personnel, to the building itself.

Friction and vibration are the twin arch enemies of man-made machines. You have given a lot of thought to the bearings of your new product. Have you given equal attention to the mountings?

Whether you make gas-electric shovels or radios, huge printing presses, or delicate laboratory instruments; whether your problem is to control vibration of the entire assembly, to protect the assembly from outside shock and vibration, or to isolate instruments in the assembly from vibration of other parts, Lord *Bonded Rubber* Shear Type Mountings give the answer.

For almost a generation Lord has pioneered and led the way to constantly greater victories over the devastating effects of vibration. Let Lord engineers, with their specialized knowledge of vibration control, team up with your design engineers.

That team will give you a product of which you will be doubly proud; a product whose quiet efficiency will match its beauty, and whose enduring qualities will make enduring friends.

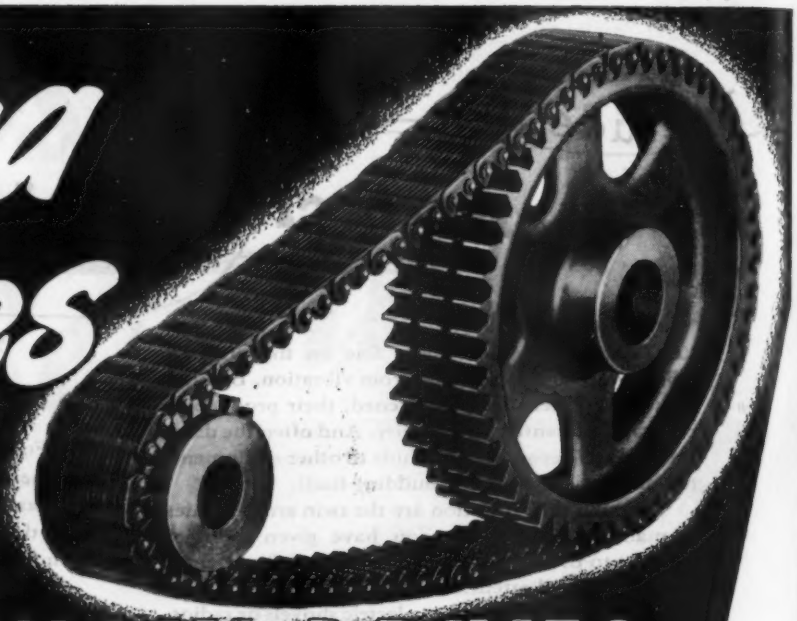
IT TAKES **BONDED RUBBER** *In Shear* TO ABSORB VIBRATION

LORD MANUFACTURING COMPANY
ERIE, PENNSYLVANIA

SALES REPRESENTATIVES
NEW YORK - - 280 MADISON AVE.
CHICAGO - 520 N. MICHIGAN AVE.
DETROIT - - 7310 WOODWARD AVE.
BURBANK, CAL. - 245 E. OLIVE AVE.
CANADIAN REPRESENTATIVES
RAILWAY & POWER ENGINEERING CORP., LTD.
TORONTO, CANADA

Originators of Shear Type Bonded Rubber Mountings

Extra Values OF MORSE CHAIN DRIVES



Besides—

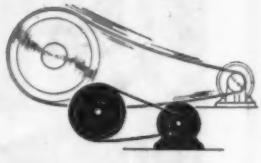
Teeth Not Tension

Morse Silent and Roller Chain Drives not only offer positive drives, but also many other features that save time, space and money and give increased and more uniform production. Some of these MORSE features are:

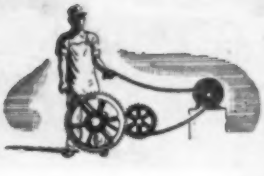
SPACE SAVINGS

Morse Silent Chain Drives operate efficiently over small wheels on short centers, saving valuable space.

POWER SAVINGS



Morse Silent Chain Drives save power because they can't slip.



EASY CHANGING

Morse Silent Chains are easily connected on the job and do not necessitate dismantling bearings or parts of a machine.

WORK UNIFORMITY

When Morse Chain Drives transmit power from source to machines, speed of operation remains constant. Uniformity prevents scrap.

Weigh Morse Chain Drives savings and advantages against all other drives . . . You will find Morse merits your approval. Consult a Morse representative on your postwar power transmission plans.

SPROCKETS CHAINS FLEXIBLE COUPLINGS CLUTCHES

MORSE *Roller and Silent* CHAINS

MORSE CHAIN COMPANY • ITHACA, N.Y. • DETROIT 8, MICH. • A BORG-WARNER INDUSTRY

Crushing Stone Slashing Costs!

- **Maintenance cost — reduced 50%**
- **Compact drive — saves four-fifths space**

In operation 24 hours a day under peak loads, this modern drive decreased maintenance cost 50% over the former type drive. The Lime and Stone Company found Dayton V-Belts required one-fifth as much space because of extreme short center-to-center distances possible without the use of idlers.

Other important advantages—since Dayton V-Belts deliver full power with less belt tension, they prevent excessive bearing wear . . . and by absorbing terrific shock loads, lengthen the life of your equipment.

Your Dayton V-Belt Distributor can bring advantages like these into your plant. It will pay to investigate Dayton's three exclusive advantages:

1. Dayton Rubber, as World's largest manufacturer of V-Belts, offers you vast experience in Power Transmission Engineering.

2. This experience is made available to you through trained specialists in your Dayton V-Belt Distributor's Organization.

3. The technical excellence of Dayton Rubber gives you V-Belts pronounced unsurpassed both in mechanically correct design and in quality of construction.

Call *your* Dayton V-Belt Distributor! Ask how Dayton Power Transmission Engineering can help you.

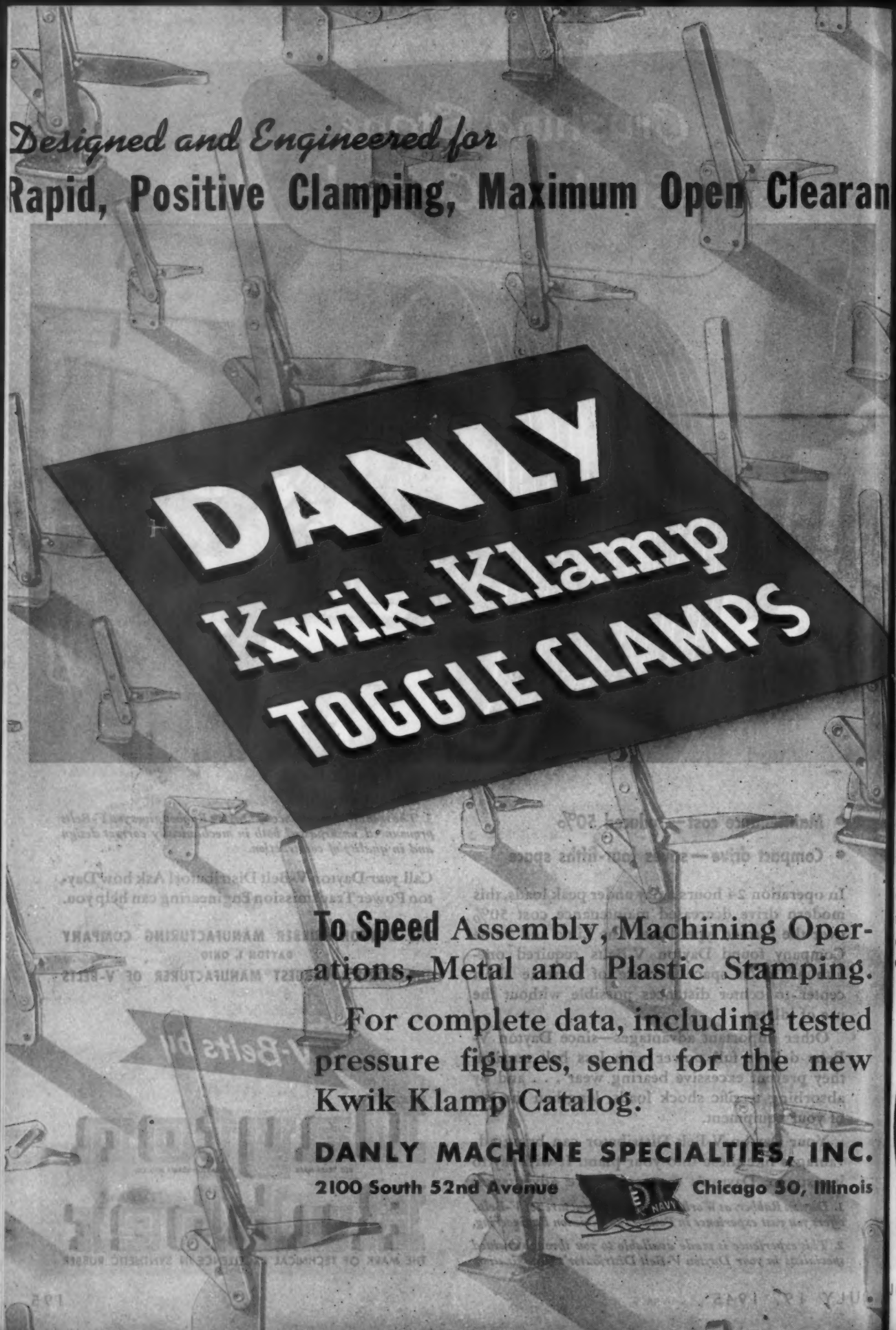
THE DAYTON RUBBER MANUFACTURING COMPANY
DAYTON 1, OHIO
THE WORLD'S LARGEST MANUFACTURER OF V-BELTS

V-Belts by

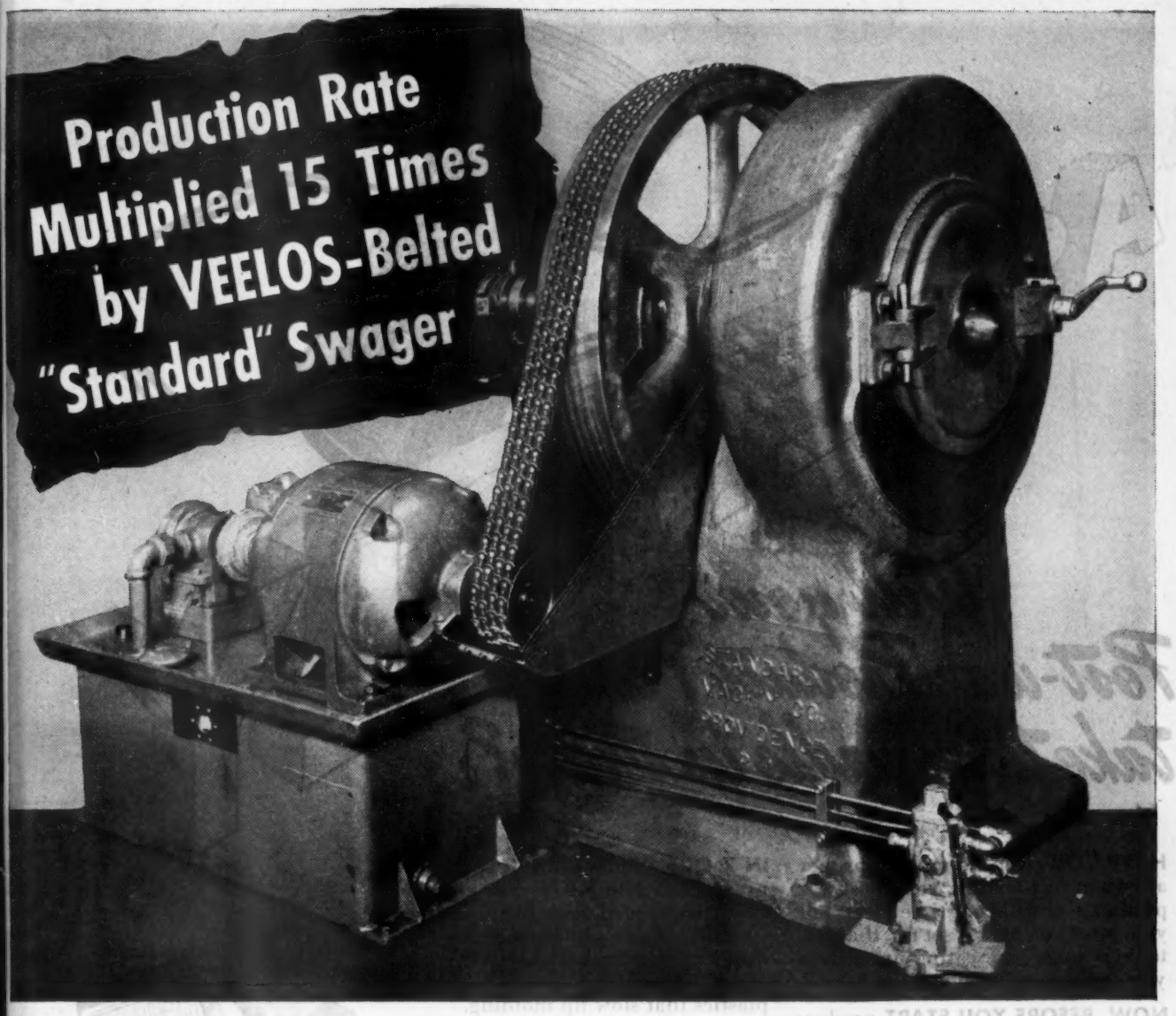
Dayton Rubber

REG. TRADE MARK THE DAYTON RUBBER MFG. CO.

THE MARK OF TECHNICAL EXCELLENCE IN SYNTHETIC RUBBER


Designed and Engineered for
Rapid, Positive Clamping, Maximum Open Clearan
DANLY
Kwik-Klamp
TOGGLE CLAMPS
To Speed Assembly, Machining Operations, Metal and Plastic Stamping.
For complete data, including tested pressure figures, send for the new Kwik Klamp Catalog.
DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue
Chicago 50, Illinois

Production Rate Multiplied 15 Times by VEELOS-Belted "Standard" Swager



THE NAVY needed a swager that would attach aircraft fittings to steel cables at record breaking speed. Standard Machinery Company, of Providence, designed this improved model that has increased the former established production rate as much as 15 times.

It's significant that the V-belt chosen for this high-speed swager is Veelos—the adjustable V-belt. For Standard required a drive that delivered power smoothly . . . that promoted continuous machine production . . . a drive with the following advantages of Veelos:

1. Smooth Power Delivery: Easy adjustment of Veelos length assures that each strand of a multiple V-belt will carry its exact share of the load. All strands constantly work together, *delivering full power with minimum vibration.*

2. Quick Adjustment: With Veelos in rolls, V-belts can be replaced in a few minutes . . . maintaining machine production . . . reducing machine downtime.

Perhaps these same Veelos advantages that appealed to Standard are of special interest to you. Or perhaps you will find others among the 12 major Veelos production advantages more important to you. It will pay to know! Write today for *free 8-page illustrated manual* giving Veelos applications, construction detail, installation directions and engineering data.

MANHEIM MANUFACTURING & BELTING CO., MANHEIM, PA.

VEELOS
THE LINK
V-BELT
Adjustable to any Length
Adaptable to any Drive

Link Construction Ups Production

Will your Post-war Product Plans take this hurdle in stride?

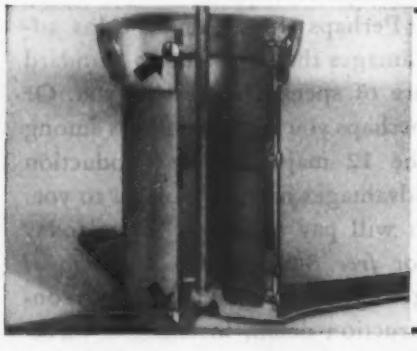
HAVE YOU given assembly its proper attention in planning your post-war product – or will your time sheets tell you, after you are all set up, that fastening "bugs" are eating up savings you could have been making?

NOW, BEFORE YOU START production, question every fastening. Find out where you can use the short cut method – with P-K Self-tapping Screws – before you put up with slower, more complicated methods.

IN 7 OUT OF 10 CASES experience proves that with P-K Screws you can save time – speed assembly – cut costs – reduce rejects – improve products – by eliminating needless tapping, awkward bolting, costly inserts in plastics that slow up molding.

ASK A P-K ASSEMBLY ENGINEER to help you find all the savings you can make – often from 30% to 50% – or, send assembly details for recommendations.

HELPFUL FASTENING GUIDE—FREE!
The 18 tab-indexed pages are crammed full of information on where and how to use P-K Self-tapping Screws, in metals or plastics. File size, fitted with wall-hanger. Write for it. Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.



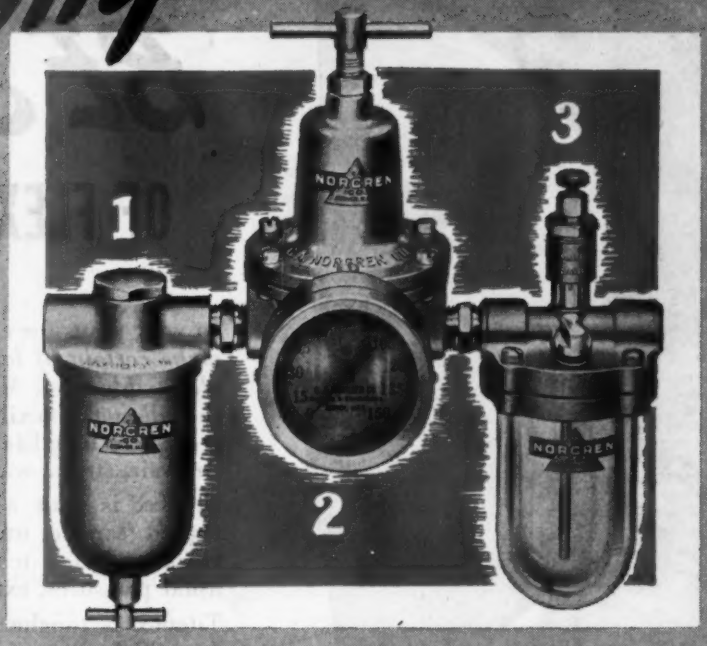
FASTER ASSEMBLY OF AIRCRAFT SEATS NO SACRIFICE OF STRENGTH

"P-K Type 'F' Screws enabled us to make two important assembly short cuts . . . we eliminated tapping, and solved troublesome riveting problems," says Warren McArthur Corp., New York. "P-K Screws give us the rigid unshakable fastening we must have, without the use of lock washers." Sectional view shows some of fastenings to aluminum.

PARKER-KALON
Quality-Controlled
SELF-TAPPING SCREWS

FOR EVERY METAL AND PLASTIC ASSEMBLY

Complete AIR TOOL PROTECTION



WITH A NORGREN LUBRO-CONTROL UNIT

An assembly of filter, regulator and lubricator, less than a foot long, readily installed right in the air line.

Cut your maintenance costs on air driven tools and cylinders with this 3-in-1 unit.

FILTER—eliminates dirt, dust and pipe scale from the air stream, and by its design and baffle action prevents oil emulsion and moisture from reaching the tools.

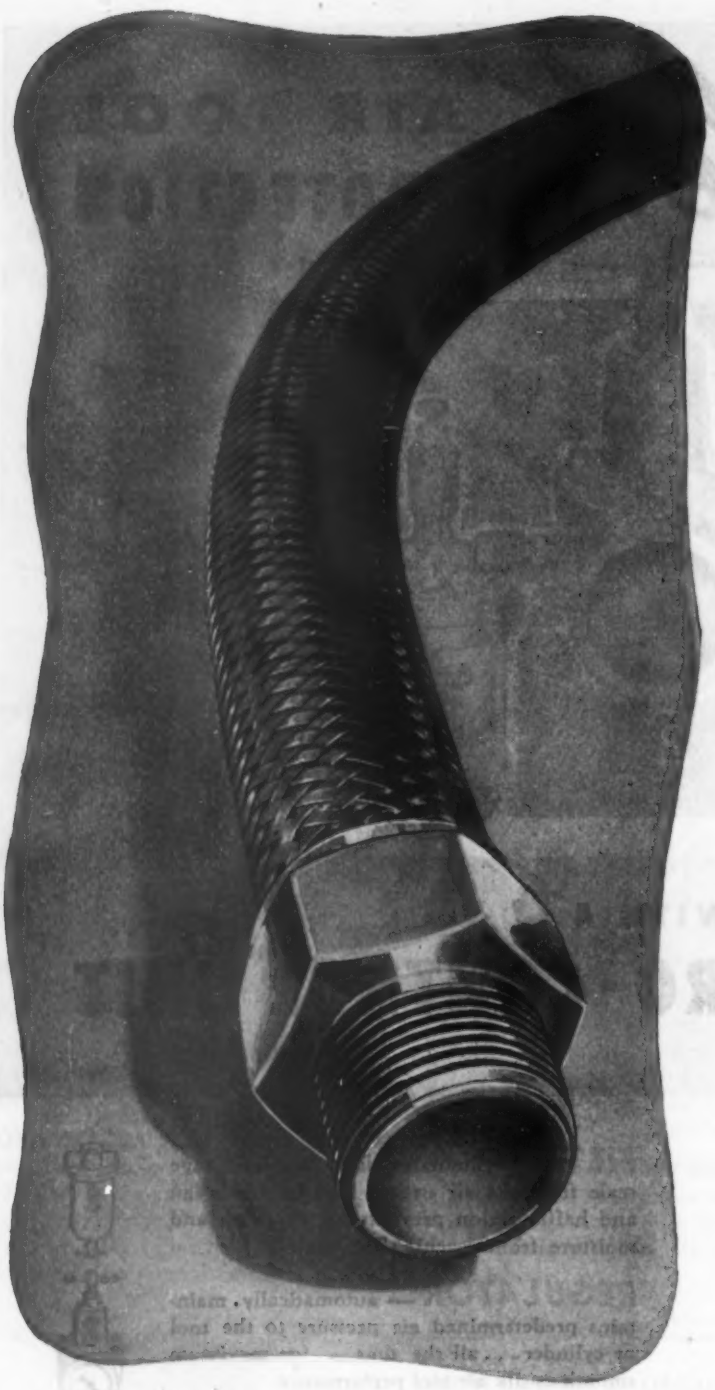
REGULATOR — automatically maintains predetermined air pressure to the tool or cylinder . . . all the time . . . for maximum smooth-as-silk air tool performance.

LUBRICATOR—Injects just the right amount of oil into the air stream, coating all moving parts with a protective film of oil. Works only when the tool operates . . . stops corrosion when tool is idle, requires no attention from the operator.

A size and type for every purpose

WRITE TODAY FOR CATALOG 400.
C. A. NORGREN CO., 220 SANTA FE DRIVE . . . DENVER 9, COLORADO

Norgren



Preparing for Peacetime Production?

BE SURE

OF FLEXIBLE LINES

In your plans for coming civilian production, *make certain of long, trouble-free service on all flexible lines.* Make certain with Titeflex—the *all-metal* flexible hose with outstanding records of long life in the conveyance of coolants, air, steam, water, other liquids or gases.

Titeflex is your assurance of long, uninterrupted service under conditions of severe vibration, high temperatures, corrosion, unusual pressures, extraordinary abrasion.

Titeflex is tougher, stronger, because it has *four* thicknesses of metal at the point of greatest wear. And it inherently resists high pressure or elongation because its metal braiding is *woven* on as it is being manufactured.

All types and sizes of Titeflex all-metal, flexible tubing are available to meet every industrial requirement.

TITEFLEX, INC.
535 Frelinghuysen Avenue
Newark 5, N. J.

ARMY E NAVY

Titeflex

REG. U. S. PAT. OFF.

WHEN YOU TOOL-UP FOR RECONVERSION, these Titeflex representatives and distributors will gladly survey all flexible lines and make recommendations, without obligation.

REPRESENTATIVES

J. M. Borland, Titeflex, Inc.
Room 310, Hippodrome Bldg.
Cleveland 14, Ohio

A. W. Barber
Delavan Engineering Co.
414 Twelfth Street
Des Moines 9, Iowa

Roy M. Fletcher
3863 Carnavon Way
Los Angeles 27, Cal.

Otis Foster
4004 N. 5th Ave.
Birmingham 6, Ala.

C. V. Gooding
Chamber of Commerce Bldg.
Denver 2, Col.

E. Hardcastle, Wembly Chambers
Hunter and Phillip Streets
Sydney, Australia

Neil W. Jones
Jones Automotive Co.
303 No. Green St.
Greensboro, N. C.

Wade L. Jones
Holly Hill, Fla.

R. W. Lewis
Crystal Lake, Ill.

Olin S. Livingston
1640 Fairmount Ave.
Philadelphia 30, Pa.

S. S. McCutchen, Titeflex, Inc.
Room 202, Engineering Bldg.
Chicago 6, Ill.

D. A. Noble
5-211 General Motors Bldg.
Detroit 2, Mich.

F. L. O'Conner, Titeflex, Inc.
40 Federal St.
Boston 10, Mass.

L. P. Ohliger
East Canal Rd.
Brockport, N. Y.

Arthur O. Secord
525 Federal Bldg.
Toronto 2, Ontario, Canada

G. O. Simpson
Mission, Kan.

Robert Smith
P. O. Box 2064
Dallas 1, Texas

O. M. Thornton, Titeflex, Inc.
1020 Lafayette Bldg.
Philadelphia 6, Pa.

J. H. Young
1309 Grant Street, Denver 3, Col.

DISTRIBUTORS

J. F. Dixon & Co.
1835 South Hope Street
Los Angeles, Cal.

Brunton's Automotive Svce.
1460 Pine Street
San Francisco, Cal.

Automotive Engineering Co.
4549 Olive Street St. Louis, Mo.

Beach Wittman Co.
1820 McGee Street
Kansas City, Mo.

Tracey & Co.
9th, 10th and Glisan St.
Portland, Oregon

L. C. Biglow & Co.
250 West 54th Street
New York 19, N. Y.

Sunset Electric Co.
P. O. Box 3148
Seattle, Washington

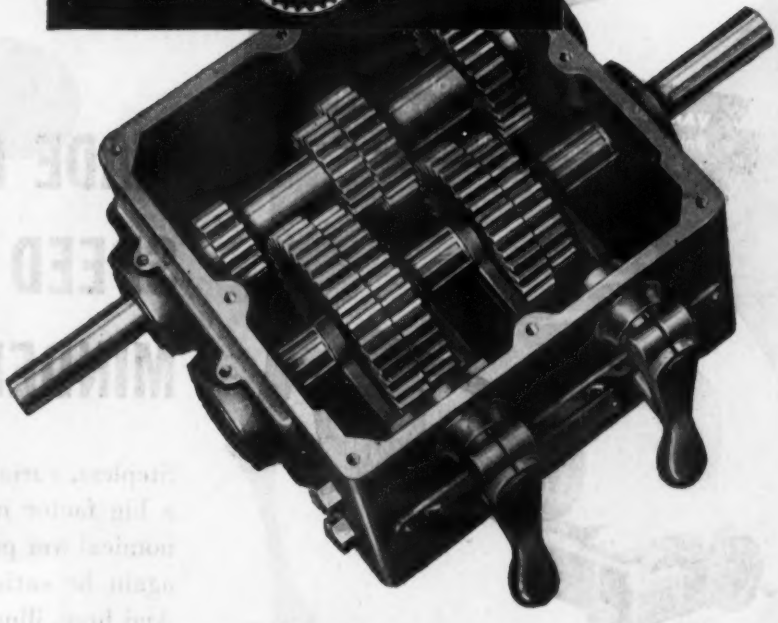
F. J. Fowler, Fowler Electric Co
2901-3 Nicollet Avenue
Minneapolis, Minn.

A. E. Borden Co.
145 High Street
Boston, Mass.

W. J. Connell Co.
121 Brookline Avenue
Boston, Mass.

Step In with UNI-DRIVE and Step Up PRODUCTION!

TURNER
UNI—DRIVE
Motorizes Machine Tools



- No belts to shift. Drives to large step of cone at all speeds.
- Eliminates overhead line and counter shafts.
- All advantages of geared head, with belt-drive smoothness.

SAVES TIME...CUTS COSTS!

Yes sir!...when Uni-Drive comes into your plant, up goes production... down goes production costs! Saves precious time. Helps to keep work rolling out on schedule. Users report 25% up to 300% increased production. Uni-Drive is tried and proved...does a better power job on lathes, shapers, milling machines, automatic screw machines and other tools.

Uni-Drive gives safe, dependable, instant power, without shifting belts and without overhead counter shafts. This means increased plant and operator efficiency. Each unit operates independently —gives high and low speed at will. The change-over in your plant soon pays for itself... one trial will quickly convince you. See your dealer or write us.

THE TURNER UNI-DRIVE COMPANY

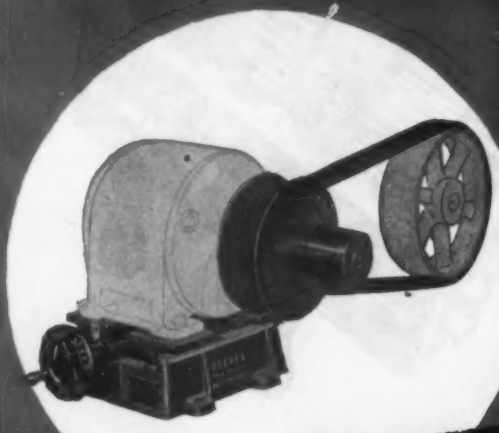
(Sales Division: Turner Machinery Co.)

3416 Terrace St. Kansas City 8, Mo.

A FEW OF MANY SATISFIED USERS

Aircraft Accessories Corp.
American Brake Shoe & F. Co.
Kellogg Division
Southern Wheel Division
Augusta Arsenal
Bendix Aviation Corp.
Brown-Lipe-Chapin Div. General Motors
Cessna Aircraft Corp.
Delco-Remy Co. Div. General Motors
Doehler Die Casting Co.
Electric Auto-Lite Co.
Frankfort Arsenal
Frisco Lines
Holtzer-Cabot Elect. Co.
Kohler Corp.
Monsanto Chemical Co.
The New York Air Brake Co.
Ohio Pattern and Fdry. Co.
Oneida, Ltd.
Parker Appliance Co.
Republic Steel Corporation
SKF Industries
Southern Railway Co.
The Timken-Detroit Axle Co.
The Todd Company
W. A. Sheaffer Pen Co.
Wagner Electric Co.
Worthington Pump Co.

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed adjustability over wide range—2:1 to 16:1 inclusive. In sizes to 87 h.p.



VARI-SPEED MOTOR PULLEY converts any standard constant speed motor to a variable speed drive within 4:1 ratio. In sizes to 15 h.p.

MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Sizes to 15 h.p. in ratios of speed variation from 2:1 to 6:1

these 3 units

MADE INDUSTRY SPEED CONTROL MINDED

Stepless, variable speed control has proved itself such a big factor in faster, more accurate and more economical war production that manufacturers will never again be satisfied with machines with fixed speeds. And here, illustrated on this page, are the three basic REEVES Speed Control units which have had most to do with this important development. More than 300,000 REEVES units are now in service. They are standard equipment on 1,866 different makes of machines.

No other speed control offers so many sizes and types to choose from—is so fool-proof and reliable. No other has the nation-wide staff of representatives, so thoroughly trained in this specialized field of engineering. Look for the familiar REEVES handwheel on any new machine you buy. It is your assurance of greater versatility, uniform quality and larger output of production. Easily installed, too, on any driven machine in service. Write for Catalog AM-450.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

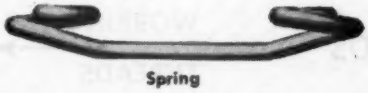
Recognized Leader in the Specialized Field of Speed Control Engineering

REEVES Speed Control

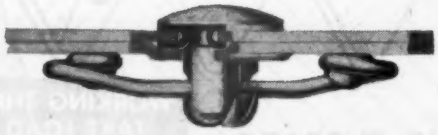
Belt line housing cover plate on Acme Gridley Automatic showing oval head type of Dzus spiral cam fastener.

Fastener Stud

Gromet



Spring



Complete assembly of the Dzus spiral cam fastener

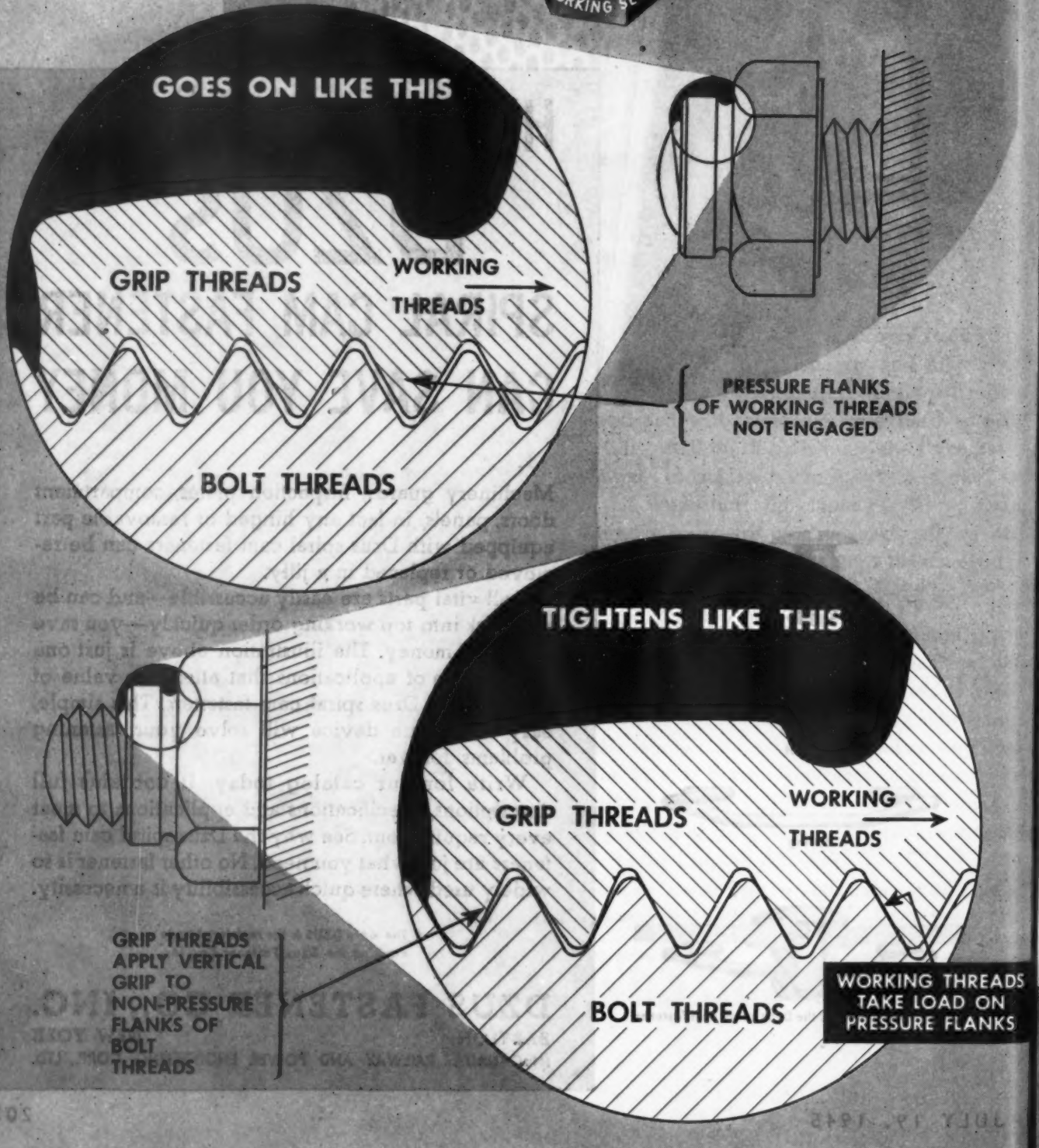
DZUS

SPIRAL CAM FASTENER

CAN SAVE YOU MONEY

Here's what happens..

IN THE LAMSON GRIP WORKING SECTION LOCK NUT


GOES ON LIKE THIS
GRIP THREADS
WORKING THREADS
BOLT THREADS
PRESSURE FLANKS OF WORKING THREADS NOT ENGAGED
TIGHTENS LIKE THIS
GRIP THREADS
WORKING THREADS
BOLT THREADS
GRIP THREADS APPLY VERTICAL GRIP TO NON-PRESSURE FLANKS OF BOLT THREADS
WORKING THREADS TAKE LOAD ON PRESSURE FLANKS

WHEN YOU APPLY A LAMSON LOCK NUT TO A BOLTED ASSEMBLY.. AND IT WILL HOLD TIGHT RIGHT WHERE YOU LEFT IT

● When you apply a Lamson Lock Nut you spin the nut on the bolt thread as freely as a Class 3 fit permits, until the bolt thread engages the thread in the *locking crown collar.* Then you'll need a wrench to seat the nut against the work—for it's the grip of the threads in the *locking crown collar* that locks it on the bolt.

Here's what happens. When the bolt is tightened by the nut, the "pressure flanks" of the working threads of the nut stress the bolt and force the collar back toward its original round form. As this occurs, the "non-pressure flanks" of the grip threads of the nut are engaged, and through them is applied the vertical pressure which locks the nut. There is no pitch interference since the thread has the same lead throughout.

Lamson Lock Nuts are tapped in the usual way, then the threaded portion of the *locking crown collar* is distorted from the round on opposite sides, causing it to grip the bolt thread like a vise. A resilient, permanent spring action is imparted by heat treatment to the *locking crown collar* of the nut. This truly is a *lock nut* —and *it is all metal!* Because it is all metal it can be used under any combination of these conditions—*Heat:* the Lamson Lock Nut is in use at elevated temperatures up to 800° Fahr. *Ice:* it is used in guns and motorized equipment in Alaska. *Steam:* all metal, it is unaffected by steam. *Oil and Water:* all metal, this nut is unaffected by either.

Re-use in the field is important when supplies are short and what is on hand must do the job. Re-use in domestic civilian applications is just as important to conserve supplies. In impartially supervised laboratory tests the Lamson Lock Nut held tightly after repeated applications, removal torque dropping less than 1 ft. lb. per cycle in 10 on-and-off cycles.

On applications where vibration and shock are severe, Lamson Lock Nuts are meeting specification requirements. They are made in standard sizes from #10-32 up to 2-inch diameters, and unless otherwise specified, are provided with a non-seizing, rust-resistant black finish. If you have applications where vibration shakes nuts loose—make your own tests with Lamson Lock Nuts. They may solve a problem for you. Ask for samples, or ask for a Lamson engineer to call and talk it over.

THE LAMSON & SESSIONS COMPANY, General Offices, Cleveland, O.
Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

"BOLTS, NUTS & SCREWS"—1944 REVISION. Cloth bound. Limited edition, 180 pages of technical, practical information. Sent prepaid for *$1.00—cash or check must accompany your order.*

"BOLTS ARE IMPORTANT!"—24-page booklet of currently useful information for buyers of headed and threaded products, and describing Lamson & Sessions' specialty fastenings which have wide industrial applications *—now, and in the post-war period. Sent gratis.*

"THE LAMSON BLUE BOOK"—is our standard Catalog of standard products excepting our Aircraft products. *Sent gratis.*

"SIMPLIFIED STOCK LIST"—Of bolts, nuts and screws, conforming to latest revisions of the Office of Price Administration, and of great value in showing you in what ratio quantities of various standard products are kept in stock for deliveries, by your jobbers and in our own (and other bolt manufacturers') warehouse stocks. *Sent gratis.*

HERE'S A COUPON FOR YOUR CONVENIENCE

THE LAMSON & SESSIONS COMPANY • 1971 West 85th Street • Cleveland 2, Ohio

Please send us ☐ Lamson Blue Book ☐ Bolts, Nuts & Screws ($1.00) ☐ Bolts are Important! ☐ Simplified Stock Sizes

Send information on ☐ Cap Screws and Set Screws ☐ Cotters ☐ Bolts ☐ Machine Screws ☐ Lamson Lock Nuts ☐ CP, HP, SF Nuts ☐ Lock-washer Screws ☐ Self-Tapping Screws

Name of Individual — Title or Kind of Work

Employed by (Name of Company)

Street Address

City and State

No. 1938—Copyright 1945—The Lamson & Sessions Co.

LAMSON & SESSIONS

BOLTS · · NUTS · · COTTERS · · CAP SCREWS · · SPECIALS

Your Jobber Stocks the Lamson Line

What do you mean?

DE-BURR AND FINISH

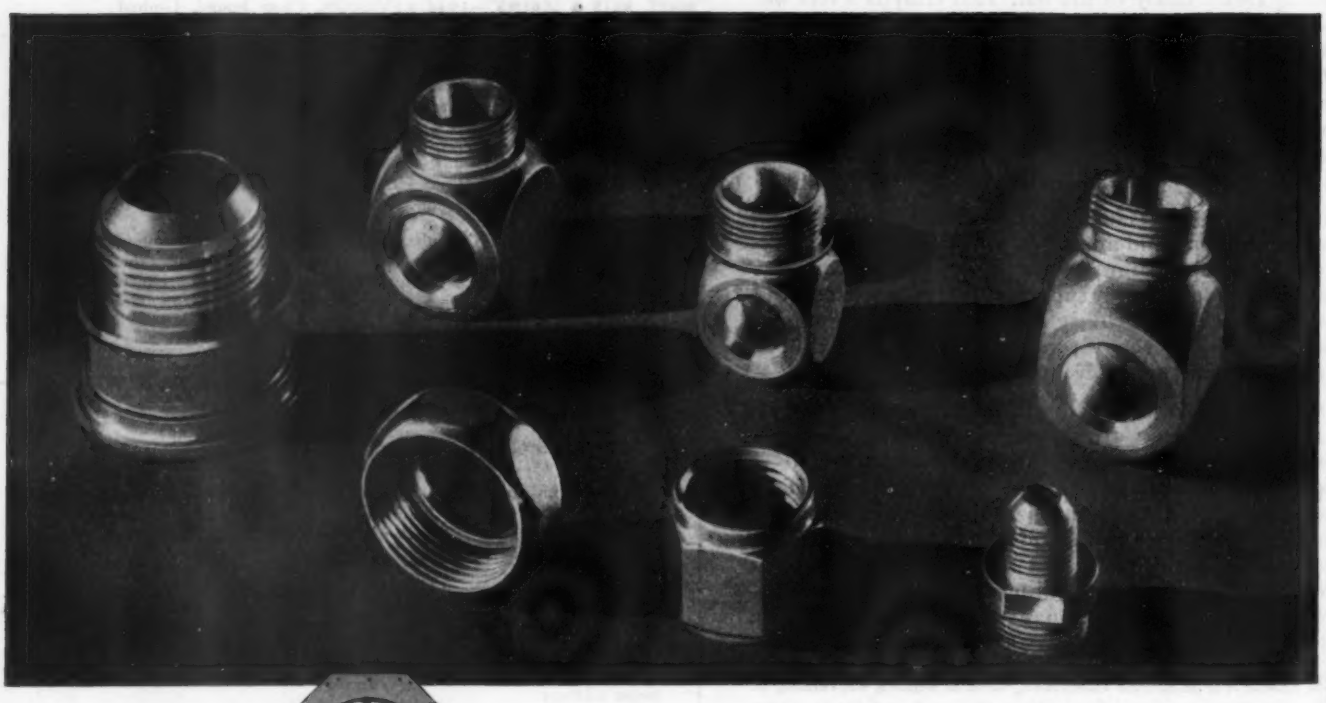
A **TON** OF THESE PARTS

DAILY WITH ONE MAN!

Sound fantastic? Not at all if your plant is equipped with the Roto-Finish Process. For this is a precision mechanical method of de-burring which cuts time, costs, man-hours drastically. And produces a much more uniform finish than ordinary hand de-burring methods. With Roto-Finish you eliminate all hand labor. One operator alone can handle the machinery in which Roto-Finish is processed.

In hundreds of plants, Roto-Finish is now being used to successfully de-burr and finish castings, forgings, stampings, and mechanical parts of steel, brass, aluminum, magnesium, stainless and nickel steels. Such companies are in splendid position to meet post-war competition with lower costs.

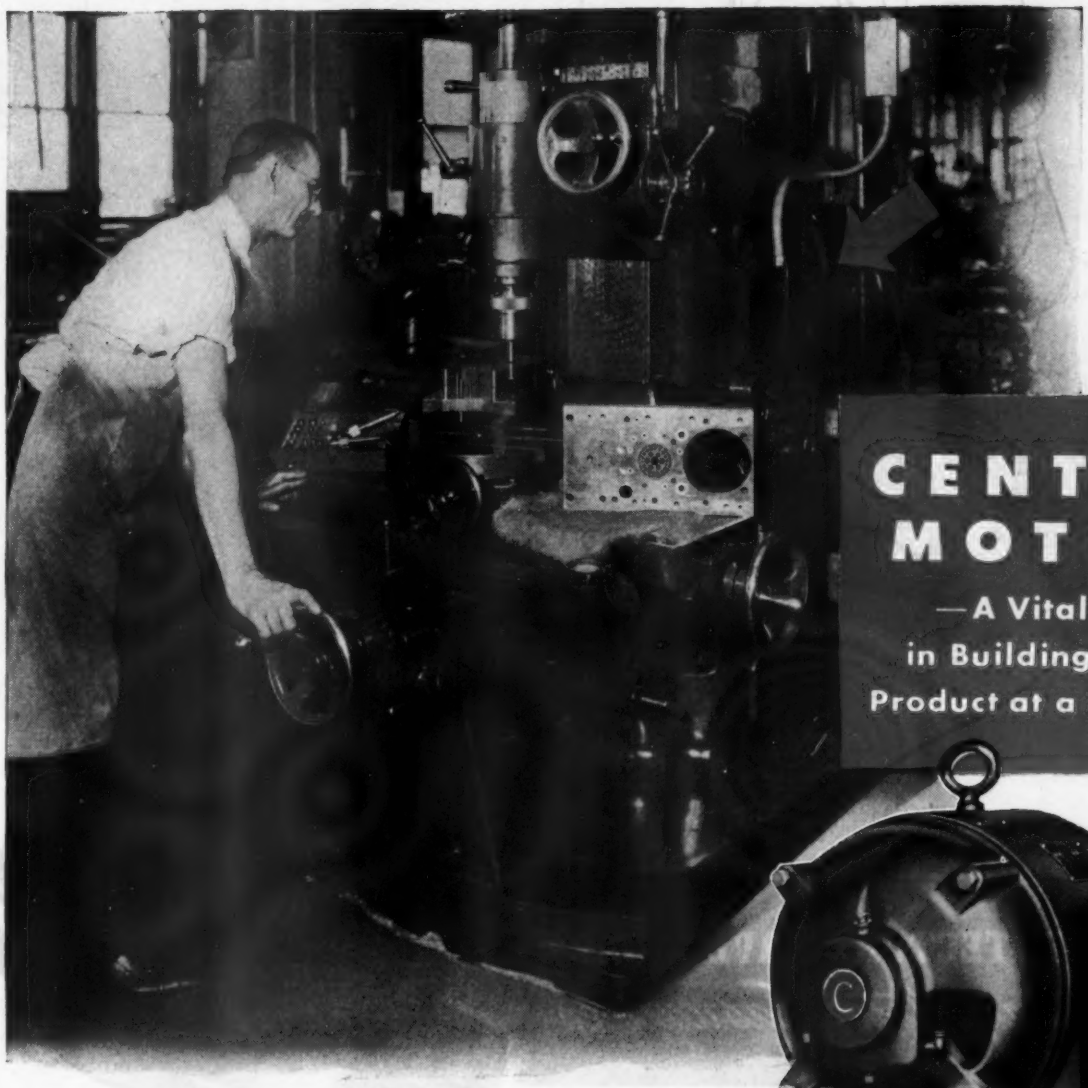
Your opportunity is here, too. Simply write for bulletins giving complete information, or save waste motion by sending sample parts for processing. There's strictly no obligation to you and we can give you all production data. THE STURGIS PRODUCTS CO., 508 Jacob Street, Sturgis, Michigan.



ROTO
THE STURGIS PRODUCTS CO.
FINISH

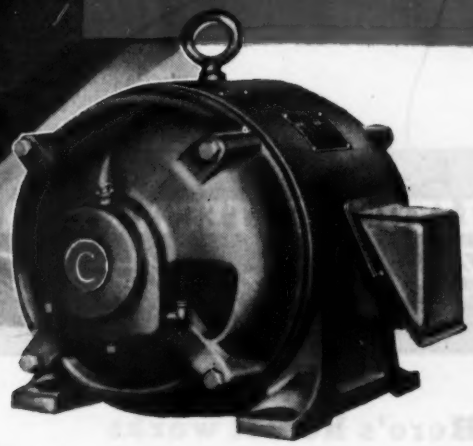
THE UNIFORM MECHANICAL PROCESS—

FOR GRINDING • DE-BURRING • POLISHING • HONING • COLORING



CENTURY MOTORS

—A Vital Factor in Building a Better Product at a Lower Cost



Get Closer Tolerance With the Help of Century Motors' Unusual Freedom from Vibration

The Century Motor on the jig boring machine shown above is inside and out of sight and forgotten for many days at a time, but it is a vital factor in holding tolerances to ± .0002" on tools, jigs, and fixtures. These Century Motors start, come up to speed, and run quietly and smoothly.

Century Motors' unusual freedom from vibration contributes to the precision work demanded of tool room machinery.

Whether for the tool room or the production shop, there is a Century Motor to meet any machine tool and practically any other application. There is a wide range of types and sizes to meet the power demands and to provide protection against the surrounding atmospheric conditions.

They are offered in almost any combination of horsepower ratings and frames from 1/20 to 600 horsepower.

Specify Century Motors on all your electrically powered equipment. Engineered to the functional characteristics of the machines they drive to assure top performance—Century Motors are a vital factor in building a better product at a lower cost.

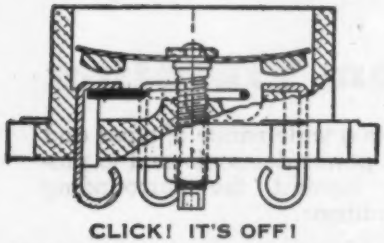
425

CENTURY ELECTRIC COMPANY • 1806 Pine Street • St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

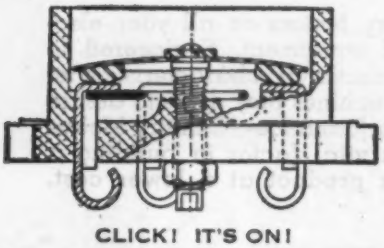
KLIXON PROTECTORS SAVE MONEY by *Preventing Motor Casualties*

Here's how it works



CLICK! IT'S OFF!

Should a motor become overheated and dangerously hot, the Klixon Protector snaps the power "off" preventing the motor from burning out.



CLICK! IT'S ON!

When the motor cools to safety, the Klixon Protector snaps the power "on" automatically if the automatic reset is specified . . . or when the reset button is pushed when manual type is specified.

You can save money by avoiding motor burn-outs and the high costs of repairs or replacements if you specify motors with built-in Klixon Motor Protectors. These Klixon Protectors guard motors from overheating regardless of the cause . . . continuous overloads, frequently repeated overloads, low-line voltage, too frequent starting and stopping, jamming of the driven mechanism, excessive ambient temperature, failure of ventilation, etc.

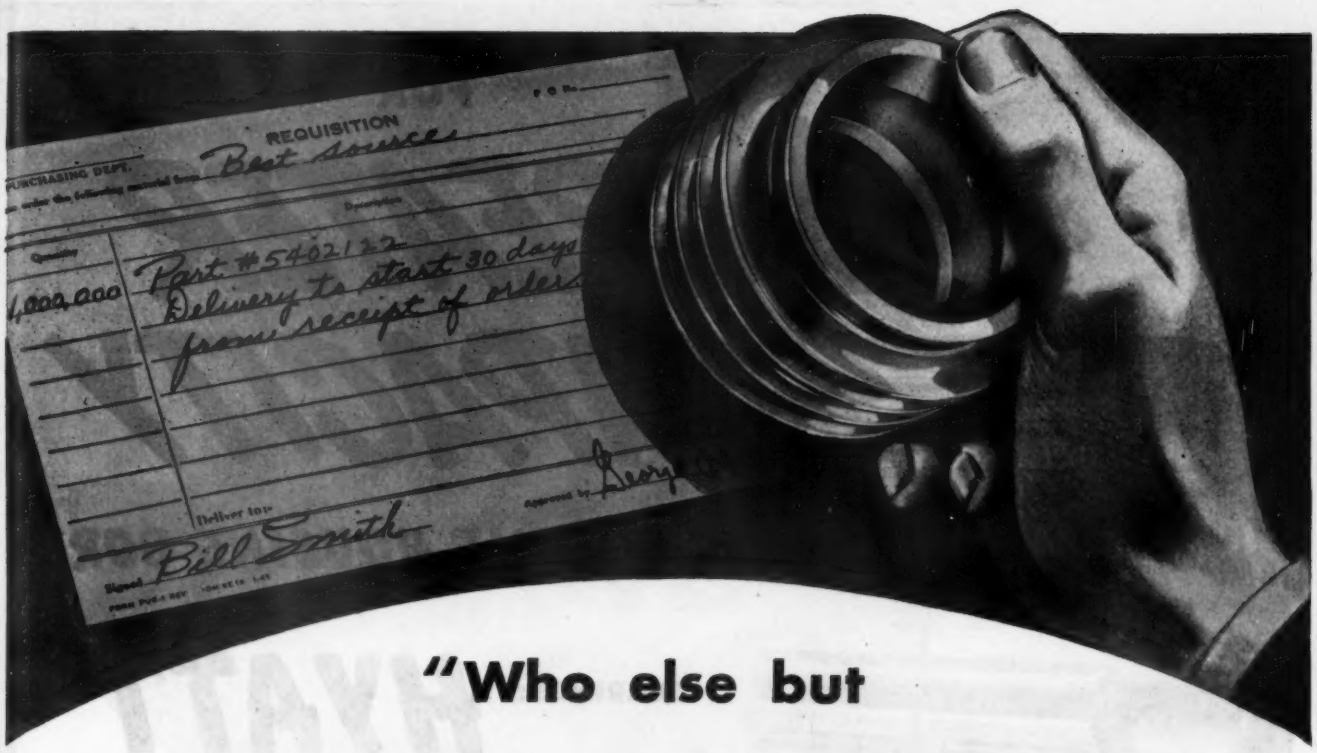
Should the motor become overheated and reach the danger point, they cut it "off the line" to prevent it from burning out. The illustrations show how Klixon Motor Protectors operate.

Klixon Protectors are built into the motor by the motor manufacturer. Therefore, they are matched exactly to each motor assuring a proven and tested combination which permits maximum operation of the motor with complete protection from burnouts.

Built-in Klixon Motor Protectors (automatic and manual reset types) are available for A. C. motors all sizes; D. C. motors up to 30 volts. Write for complete information, today.

KLIXON MOTOR PROTECTORS

SPENCER THERMOSTAT CO., ATTLEBORO, MASS.

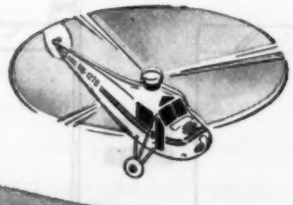


"Who else but *Aeronautical Products* could turn out a part like this, in volume?"

LET today's planning be that Peace will come tomorrow! Overnight you must be ready to stop working for the few and begin to meet the demands of the many. What will you have to sell? New products . . . new designs for old . . . test models on which to form your production pattern . . . new parts for mass civilian production? Then, *it's a job for Aeronautical Products!*

API is the story of a vigorous American enterprise that became a production giant . . . proof that engineering brains, skilled workmen and precision machinery can work wonders. » » » » Two great plants tooled to perfection . . . poised and ready to serve you *completely.* Write our Executive Sales Office for plant equipment facilities . . . be ready *when the day comes!*

BUY WAR BONDS



• *Make ownership of a safe, sturdy Aeronautical Products Helicopter a "must" in your personal postwar plan. You'll find you can afford one!*

AERONAUTICAL PRODUCTS, Inc.

DETROIT PLANT and Administrative Offices: 18100 Ryan Road, Detroit 12

API

OHIO PLANT: Washington Court House, Ohio

FOR GREATER CAPACITY IN THE SAME HOUSING BORE

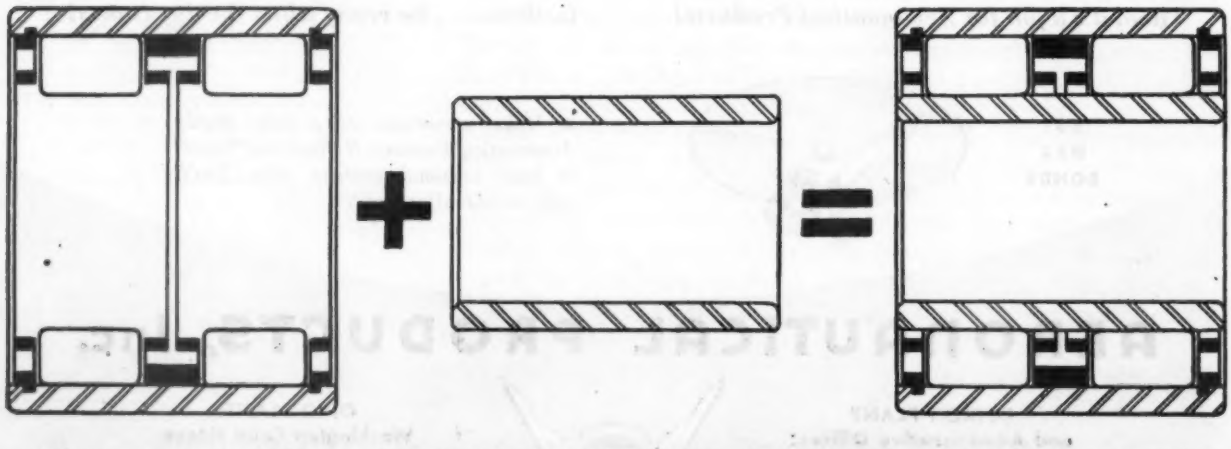
BEARINGS: HYATT

In the light series we provide a roller bearing of the same high precision as others in the Hy-Load range but in addition twice the load capacity of single row bearings of the same shaft diameter. It's the A-6200-TS "Duplex" type bearing with double roller assembly.

The component parts of this bearing are freely interchangeable. That is any inner race will fit any roller assembly of the same piece number—thus facilitating product assembly and disassembly. This bearing like the other separable inner race bearings in the Hyatt Hy-Load line can be used with the inner race omitted and the rollers operated directly on a hardened and ground shaft.

Look into the Hyatt Hy-Load bearing application advantages—three types—separable inner and outer race—self-contained—and the double roller assembly.

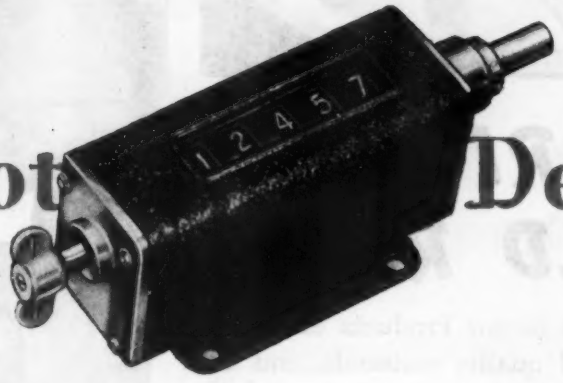
Bulletin covering all types upon request.

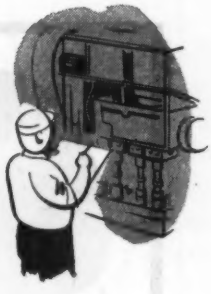


HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION

Harrison, New Jersey • Chicago • Detroit • Pittsburgh • Oakland, California

You can Employ Veeder-Root Devices as Salesmen . . . as well as Production "Countrollers"





Veeder-Root Devices can do an outside job of sales-building for you, as well as an inside job of production-building. They can be easily designed and built into your products as an *extra service* that can be effectively merchandised to your prospects and customers . . . in terms of the same advantages you get from the *Count*rolled production machines in your own plant: avoidance of delays, errors, lags, shortages; ability to schedule production more efficiently.

Veeder-Root Devices are compact...have simple drive-connections... come in types to fit into the design limitations of your present or postwar products, without necessitating basic design-changes. So why not send this memo *now* to your sales and design engineers: *"Investigate advantages of designing Veeder-Root Devices into our products."*

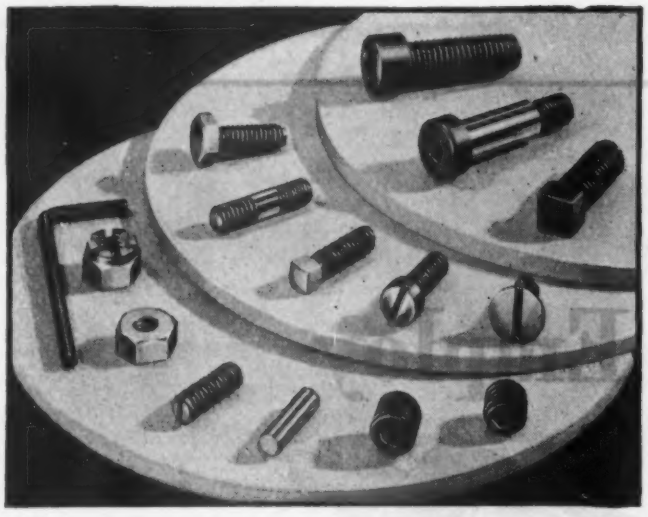
The Counting House

of Industry

VEEDER-ROOT INC.

Hartford 2, Connecticut

***In Canada*: Veeder-Root of Canada, Ltd., Montreal**
***In England*: Veeder-Root Ltd. (New address on request)**



MADE RIGHT --SOLD RIGHT

"Chicago" Standard Screw Products are accurately made of finest quality materials, and are available to you through our selected distributors . . . Authorized distributors carry complete stocks of all items in this line.

CHICAGO *Safety Plus* line includes:
Socket Head Cap Screws • Socket Set Screws • Stripper Bolts • Square Head Dog Point Set Screws • Pipe Plugs • Keys for Safety Plus Products.

Complete line includes:
Hexagon Head Cap Screws • Square Head Cup Point Set Screws • Headless Set Screws • Fillister Head Cap Screws • Flat Head Cap Screws • Taper Pins • Milled Studs Semi-Finished Hexagon Nuts • Semi-Finished Hexagon Castellated Nuts.

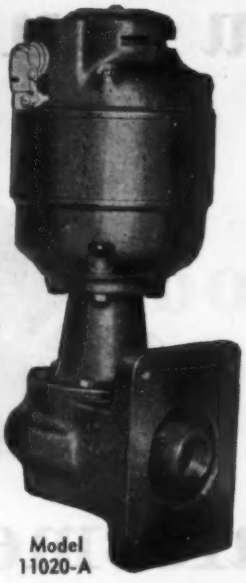
Sturdy cardboard packages, clearly labeled and carefully packed, protect "Chicago" Standard Products from the time they leave our factory until they are required for actual use. You can count on a standard of quality which is sure to satisfy.

These Fine Products are sold only thru Authorized Distributors

THE CHICAGO SCREW CO.
ESTABLISHED 1872
1026 So. Homan Avenue Chicago 24, Ill.

---

designed to
SAVE MONEY


Model 11020-A

RUTHMAN
GUSHER
COOLANT PUMPS

You save money three ways when you specify Ruthman Gusher Coolant Pumps on your machines. Sturdy, simple construction reduces maintenance costs. . . . Steady uninterrupted flow of coolants allow you high precision production on your machined parts . . . and long trouble free life minimizes replacement costs.

There's a Gusher for Every Requirement.
Write now for catalog.

THE RUTHMAN MACHINERY CO.
1809 READING ROAD
CINCINNATI 2, OHIO
The "GUSHER"—A Modern Pump For Modern Machine Tools

AL-LO METAL SPINNING

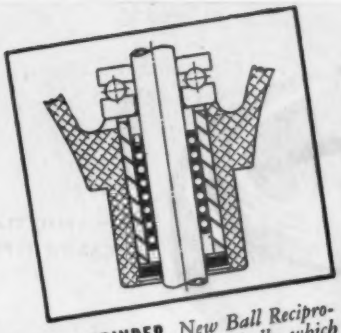
DESIGNS IN ALL METALS . . . *produced and finished to closest accuracy*

The parts shown here are typical of the class of work which AL-LO is prepared to produce by spinning. Our facilities enable us to handle production spinning of large or small parts, promptly and accurately.

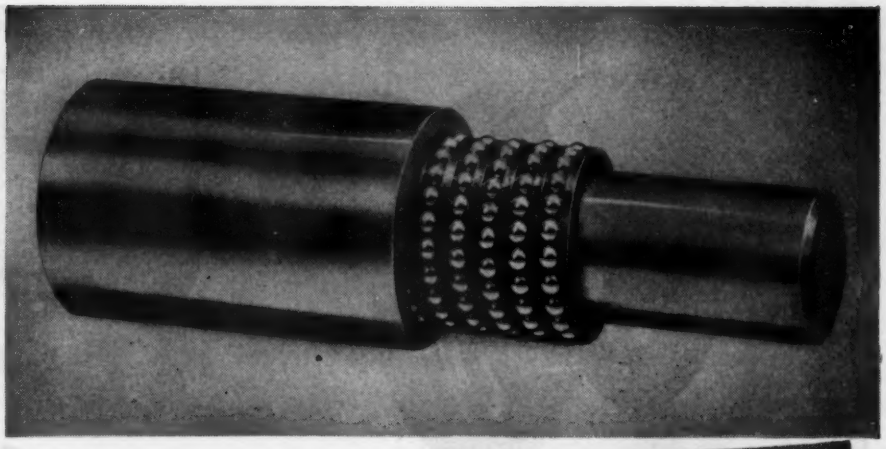
Investigate the possibilities of our spinning service as a means of solving your problem. Let us estimate on your production welding and brazing requirements also.

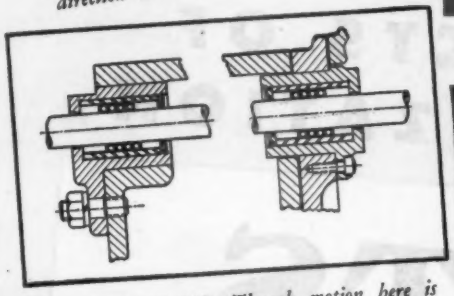
Send us your specifications and ask for our quotation.

ALEX LOWENSTEIN
301 WATER ST. BINGHAMTON, N. Y.
"Production Metal Spinning Experts"



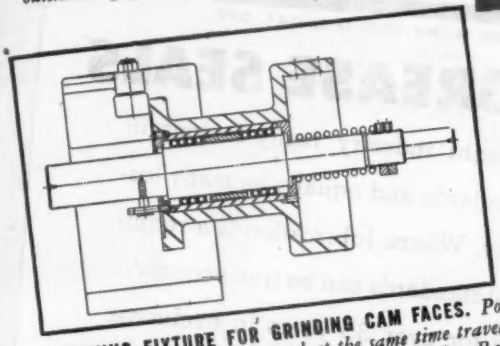
VALVE SEAT GRINDER. *New Ball Reciprocating Bearing here carries spindle, which not only revolves but also travels in axial direction to relieve contact intermittently.*



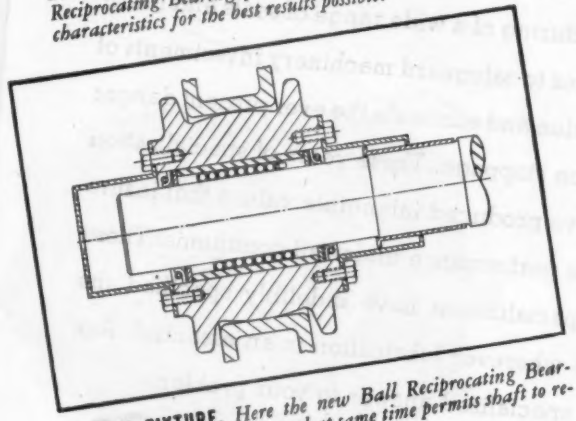


GOVERNOR SLIDE BAR. *Though motion here is axial only, freedom from drag is required and new Ball Reciprocating Bearing accomplishes this with outstanding efficiency.*

RECIPROCATING BEARING FINDS WIDE APPLICATION



CHUCKING FIXTURE FOR GRINDING CAM FACES. *Pot chuck at the right revolves and at the same time travels horizontally to perform a cam profiling action. New Ball Reciprocating Bearing provides the required application characteristics for the best results possible.*



WELDING FIXTURE. *Here the new Ball Reciprocating Bearing allows wheel to rotate and at same time permits shaft to reciprocate back and forth as required.*

Because it allows free axial as well as radial motion . . : combined with unusually high anti-friction capacity . . . Torrington's new Ball Reciprocating Bearing is finding wide use wherever ball bearing anti-friction qualities are desired in rotation, reciprocation, oscillation or combinations thereof.

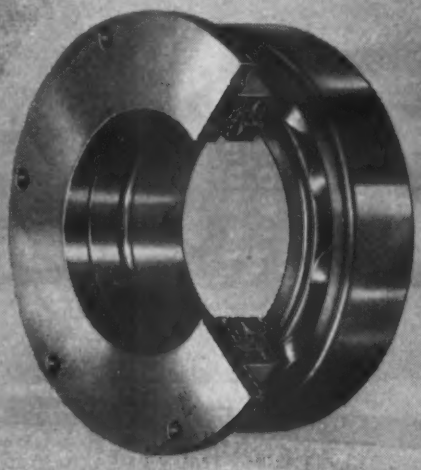
Designed by the engineers of Torrington's Bantam Bearings Division, this modern and efficient unit employs a helix to separate the balls and retain them. This permits the use of *approximately twice as many balls* as the conventional sleeve type retainer, with corresponding increase in anti-friction efficiency. In addition, the unit has the traditional Torrington advantages of compactness, simplicity in design, and built-in long life.

Shown on this page are just a few of the many applications where the new bearing is helping modern equipment do a better job. Would you like to know how it can improve the efficiency of *your* equipment? Write for a copy of Bulletin 105, which gives full engineering and application data. And feel free to bring your anti-friction problems, routine or unusual, to Torrington's Bantam Bearings Division.

THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION
SOUTH BEND 21, INDIANA

TORRINGTON BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

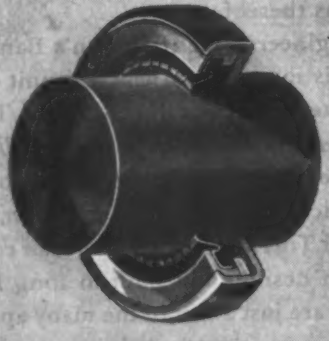


HIGH SPEED SEAL
(FLANGE TYPE)

HIGH SPEED SEAL
(PRESS FIT TYPE)

PRODUCTS OF SPECIALIZATION

FELT OIL AND GREASE SEAL



TRU-CIRCLE SEAL

PRECISION SEAL

Request your copy of Gits catalog No. 60 —the encyclopedia of lubricating devices.

GITS

TRADE MARK REG U. S. PAT. OFF.

OIL AND GREASE SEALS

Specialization has taught industry many lessons in higher, precision standards and equally as many lessons in true economy. Where lubrication is a requisite—only the highest standards can be true economy. Gits has specialized for over 35 years in exclusive research of lubrication methods and the development and manufacturing of a wide range of seals and lubricating devices to safeguard machinery investments of unlimited value and eliminate the ever present danger of production stoppage. These years of specialization by Gits, have produced intangible values that insure dependable performance under all conditions. These years of specialization have indelibly specified the name Gits wherever lubrication is an essential. Ask Gits for a specialized answer to your problems.

GITS BROS. MFG. CO.

1857 South Kilbourn Ave., Chicago 23, Illinois

Exclusive for over 35 years

The Howell Protected Type Motor, shown, gives complete protection against dripping liquids, metal chips and other falling particles. Completely streamlined—utilizing non-breakable steel frame—malleable or steel base—cast iron end plates and cast iron, weatherproof terminal box are standard construction features. Special horizontal and vertical mountings are available. *Available in sizes 5 H.P. and smaller. Other sizes and types available up to 150 H.P.*

It has come to this— but we haven't cut Howell Quality

Yes, many of those good dependable Howell Motors have been shipped by air express to those who vitally need them for the war effort. The delivery situation in the entire electric motor industry is just this serious.

But we haven't cut Howell quality in any way. Prewar standards are being rigidly maintained without any compromise whatsoever in quality.

It's to your advantage to bear with us! We recognize our obligation fully and are putting forth our maximum efforts to build more and more motors, and to see that they are distributed among users whose needs are most vital.

HOWELL ELECTRIC MOTORS COMPANY

HOWELL, MICHIGAN

Manufacturers of Quality Motors Since 1915

Plus values are assured with the combined air control action of the Marton Air Control Unit. This unit combines pressure regulator, gauge, control valve, lubricator and strainer in one neat, compact construction.

The use of the Marton Air Control Unit eliminates the extensive pipe fitting required of separate units and thereby reduces the cost of installation. It is easily adjusted, simply maintained and completely accurate!

For information write to—

MARTON
EQUIPMENT, INC.
505 Rantoul St., Beverly, Mass.
SMALLPEICE
MACHINE TOOLS AND EQUIPMENT
Manufactured in U. S. A. and Great Britain

TRADE MARK
MAXITORQ
Floating Disc **CLUTCHES**

SINGLE OR DOUBLE

WET OR DRY TYPES

SO TROUBLE-FREE

If you were to specify what you want in a clutch for your new machine tool, these features would surely be included. Compact construction; simple design; positive "in" and "out"; no drag, abrasion or heat in neutral; instant response to controls; easy adjustment; . . . and a long, trouble-free life.

Well . . . here you are! The MAXITORQ floating disc clutch has all these features and in addition it is assembled, adjusted for tension, and taken apart WITHOUT THE USE OF TOOLS.

Interesting, if true, you may say . . . but won't you also let us prove it? Tell us your needs for clutches . . . let our engineers submit solutions with standard Maxitorqs, ¼ to 15 H.P. at 100 R.P.M.

SEND FOR CATALOG NO. A73

THE CARLYLE JOHNSON MACHINE COMPANY · MANCHESTER CONNECTICUT

ACCURACY—
Provides Good Pump Performance

Pump with flange mounting, dual discharge connections and other special features.

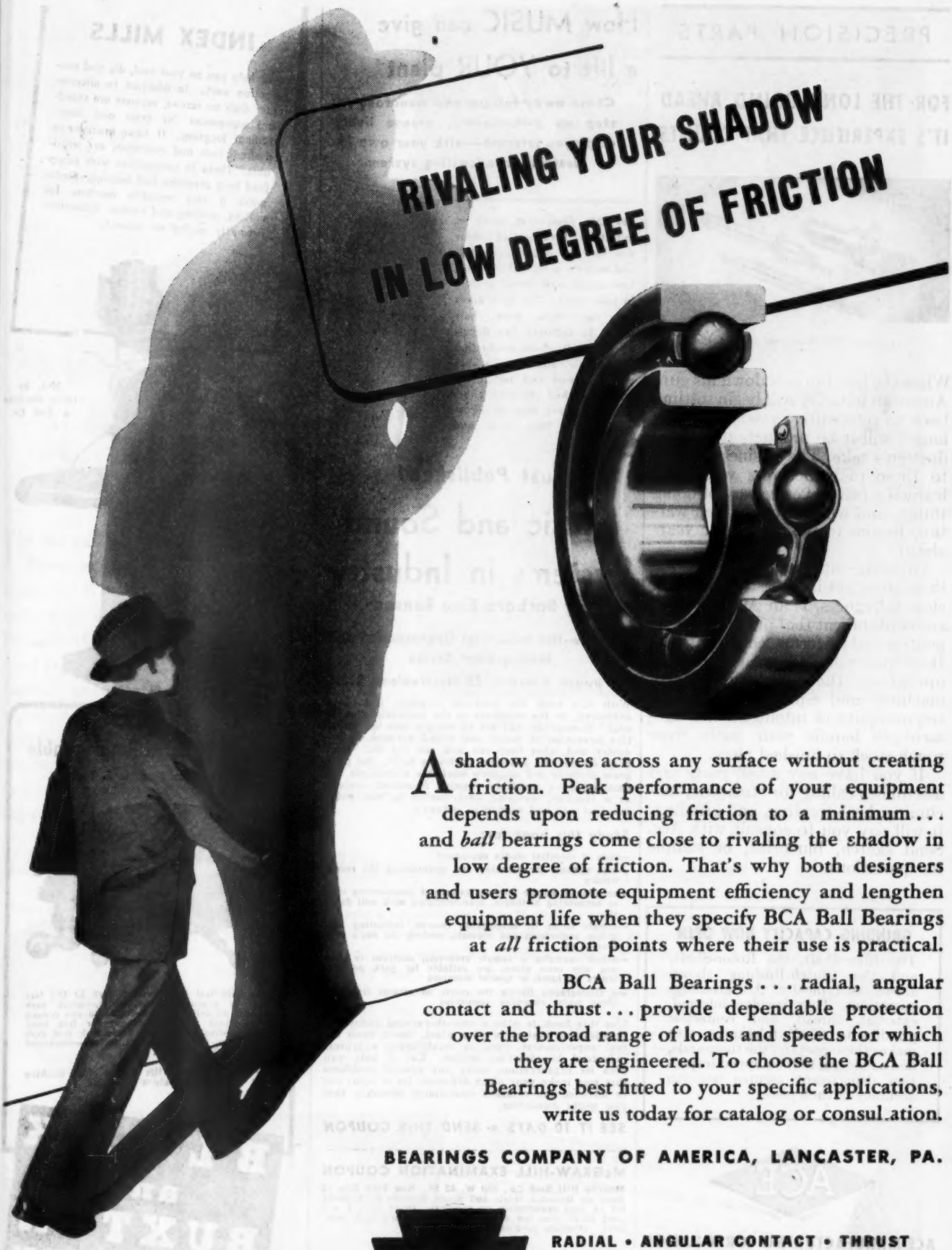
B·S

The outstanding service that Brown & Sharpe Pumps give can be attributed in no small measure to precision manufacture. This manufacture provides the faithful following of sound designs and accurately fitted parts. Catalog sent on request. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

GEARED — VANE — CENTRIFUGAL — MOTOR DRIVEN

BROWN & SHARPE PUMPS

RIVALING YOUR SHADOW IN LOW DEGREE OF FRICTION



A shadow moves across any surface without creating friction. Peak performance of your equipment depends upon reducing friction to a minimum . . . and *ball* bearings come close to rivaling the shadow in low degree of friction. That's why both designers and users promote equipment efficiency and lengthen equipment life when they specify BCA Ball Bearings at *all* friction points where their use is practical.

BCA Ball Bearings . . . radial, angular contact and thrust . . . provide dependable protection over the broad range of loads and speeds for which they are engineered. To choose the BCA Ball Bearings best fitted to your specific applications, write us today for catalog or consul.ation.

BEARINGS COMPANY OF AMERICA, LANCASTER, PA.

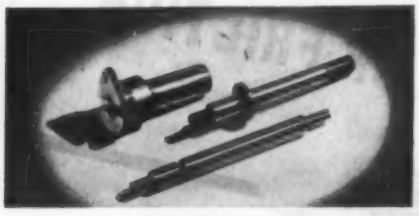
BCA

RADIAL • ANGULAR CONTACT • THRUST

BALL BEARINGS

PRECISION PARTS

FOR THE LONG GRIND AHEAD IT'S EXPERIENCE THAT COUNTS



. . . intricate brazing-jobs made easy

When the last Jap lays down his gun, American industry will begin settling back to competitive production. No longer will it be production for production's sake. The business will go to those manufacturers who have learned a faster, better way of doing things, and who can apply their wartime lessons to the peace-time years ahead.

Grinding-out small parts by the thousands, yet holding to amazingly close tolerances, is an Ace war-time accomplishment that offers real competitive and performance advantages. Here you will find the experienced operators, the up-to-the-minute machines and equipment, and the responsibility of intelligent management to handle your parts from rough stock to finished piece.

If you have any small parts and assemblies calling for stamping, machining, heat-treating, and grinding, it will pay you to consult with Ace. Send sketch, blueprint, or sample for quotations.

GRINDING CAPACITY NOW OPEN

The Idler-Shaft, the Rotor-Shaft, and the Clutch-Bushing shown above are typical of Ace grinding-operations. They involve internal, external, thread, and centerless grinding to .0002" tolerances. Ace makes these parts by the thousands, and a modern, well-equipped inspection department assures uniform accuracy of each piece.

ACE

TRADE MARK

ACE MANUFACTURING CORPORATION

for Precision Parts

1207 E. ERIE AVENUE, PHILADELPHIA 24, PA.

How MUSIC can give a lift to YOUR plant

Chase away fatigue and monotony . . . step up enthusiasm . . . arouse lively employee interest—with your own *industrial broadcasting system*

Let this pioneering study of industrial broadcasting show you how to organize, install and operate a workable, effective music and sound system in your plant. The book gives you the whole story, how music in industry has developed, how it affects production and morale, and how its special problems and techniques can be worked out most effectively in every type of industrial plant, both large and small.

Just Published!

Music and Sound Systems in Industry

By Barbara Elna Benson

McGraw-Hill Industrial Organization and Management Series

121 pages, 5¾x8¾, 13 illustrations, $1.50

With this book the program director, the plant executive, or the members of the industrial "audience" themselves will get an insight into the effective operation of music and sound systems in industry and what they can and can not do. This book defines the practical problems facing the program director and suggests workable techniques for establishing a smoothly running broadcast system as a familiar, welcome contribution to the well-being of men and women in industry.

Study this book for:

—lists of essential studio equipment

—best methods for planning and maintaining the record library

—coordinated human-interest features of broadcasting such as announcing birthdays, acknowledging work well done, etc.

—sample forms for cataloguing records, indicating employee preferences and requests, posting the day's programs, etc.

—actual examples of sample programs, analyzed to show you why some pieces are suitable for work periods, others for lunch or special occasions

—a Discography listing the music on records from the three major recording companies

Use this book to plan a smooth-running industrial broadcasting system in your plant, based upon actual experimental work in establishing a typical industrial broadcasting system. Let it help you plan its organization, solve any special problems that may make your plant different, let it point out in advance the common operational mistakes that you might encounter.

SEE IT 10 DAYS • SEND THIS COUPON

McGRAW-HILL EXAMINATION COUPON

McGraw-Hill Book Co., 330 W. 42 St., New York City 18
Send me Benson's Music and Sound Systems in Industry for 10 days examination on approval. In 10 days I will send $1.50 plus few cents postage or return book postpaid. (Postage paid on cash orders.)

Name .....

Address .....

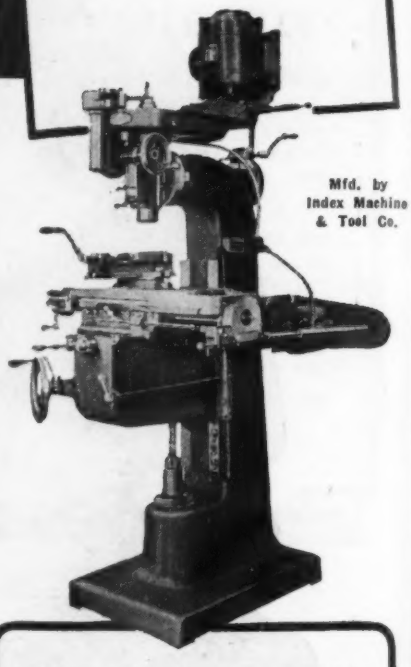
City and State .....

Company .....

Position ..... A. 7-19-45

INDEX MILLS

will help you on your tool, die and production work. In addition to micrometer dials on screws, verniers are standard equipment for cross and longitudinal locating. If finer precision is desired, rods and indicators are available. These in conjunction with power feed to a precision ball bearing spindle make a very versatile machine for milling, drilling and boring. *Literature promptly mailed on request.*



Mfd. by Index Machine & Tool Co.

12" Tool Room Rotary Table

Mfd. by Index Machine & Tool Co.

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

BLANK and BUXTON MACHINERY

3100 E. MICHIGAN AVE.
JACKSON, MICH.

STAINLESS SURFACE HARDENING Case History #3

Increasing Resistance to Erosion Caused by High Pressure Steam

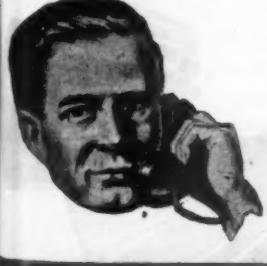
IN the manufacture of turbines, Worthington Pump and Machinery Corporation specifies treatment of all valve stems, bushings, plugs and valve seats by the Stainless Surface Hardening Process. As a result, these vital parts of Stainless Steel are given an extremely hard case that satisfactorily resists the impact of high-velocity steam, superheated to 800°F. and backed by pressures up to 900 PSI. Worthington engineers also report an important saving in manpower . . . because surface-hardened parts require less time for finishing operation than other materials.

Efficient new process will extend life of your product's Stainless Steel parts!

If you make or use Stainless parts, investigate the Stainless Surface Hardening Process. Gives up to 1100 Brinell surface hardness. Write or call today for full information. Forward some of your Stainless parts to us for sample treatment and quotations.

LET ONE CALL DO IT ALL... when you need Stainless!

TROwbridge 7000
Teletype Cambridge 547



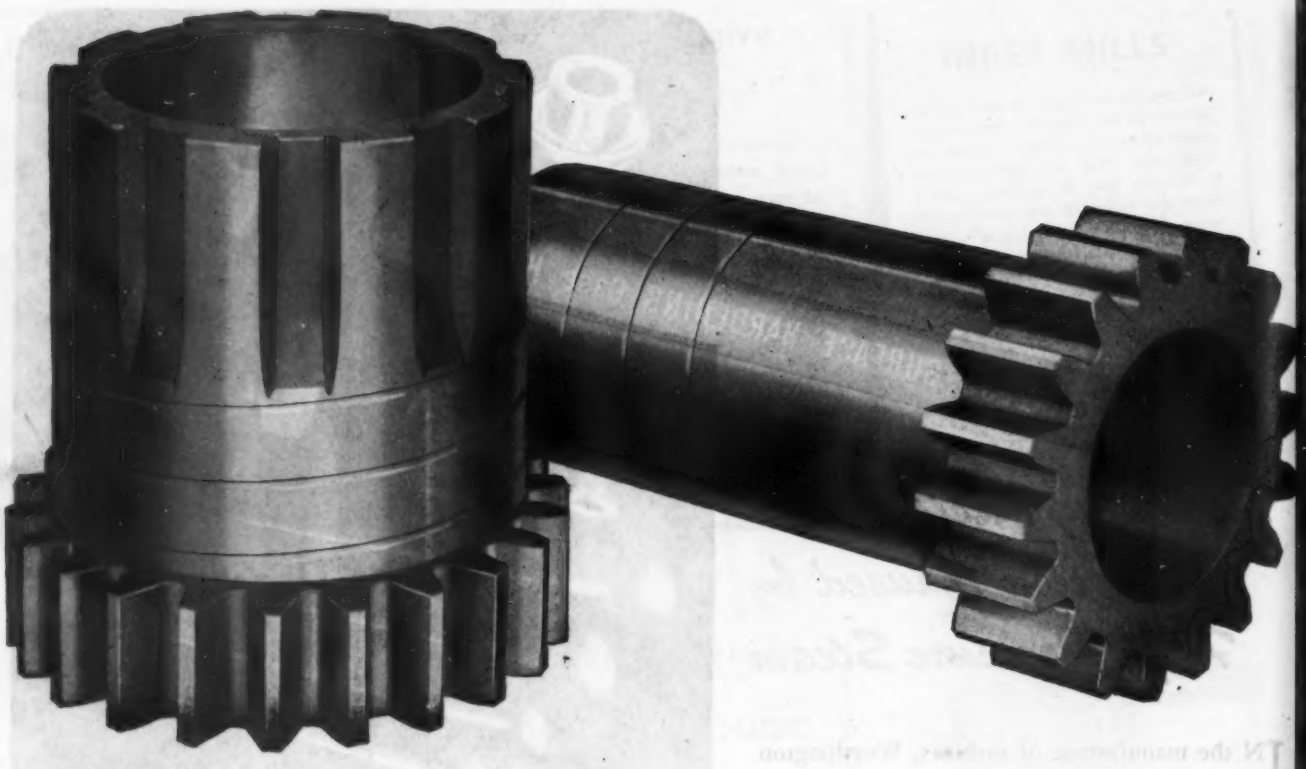
Whatever your Stainless requirements, you'll receive same-day attention to your entire order from Industrial Steels, Inc. . . . for Industrial carries the largest and most diversified warehouse stock of Stainless Steels in America. Save time . . . save money . . . get action! Phone Industrial *first*. And if you need expert metallurgical counsel regarding any Stainless fabrication or specification problem, don't fail to request it. Send for catalog. INDUSTRIAL STEELS, INC., Phone TROwbridge 7000 or Teletype Cambridge 547, 250 Bent Street, Cambridge 41, Mass.

STAINLESS SURFACE HARDENING CO.

255 BENT ST., CAMBRIDGE 41, MASS.

Subsidiary of Industrial Steels, Inc.

Stainless Surface Hardening Co.
259 Bent St., Cambridge 41, Mass.
Gentlemen:
Please send complete details regarding the Stainless Surface Hardening Process.
Name.....
Firm Name.....Title.....
Street.....
City.....State.....
We are interested in your process for hardening.....



Gears *to your specifications*

Spur Gears

Helical Gears

Splined Shafts

Worms

Worm Gears

Bevel Gears

Miter Gears

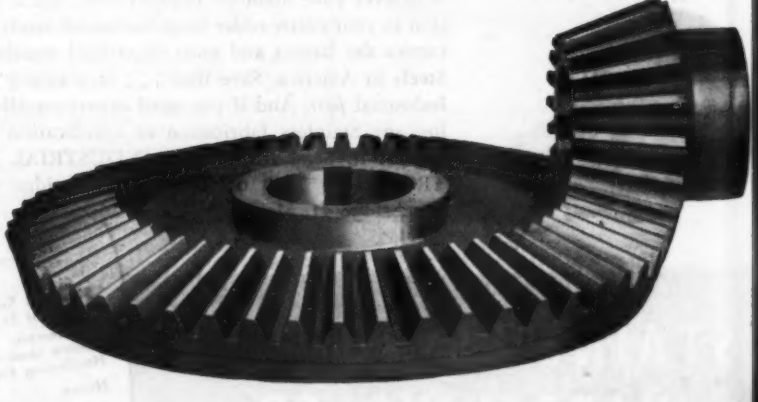
Sprockets

Ratchets

Racks

Lead and Feed Screws

Adams Gears are produced with the finest production and inspection equipment obtainable and they can be furnished to your most exacting requirements.



THE ADAMS COMPANY

1942 BRIDGE STREET — DUBUQUE, IOWA, U.S.A.

1883 — Our 62nd Year — 1945

if it's for industrial use...we make it

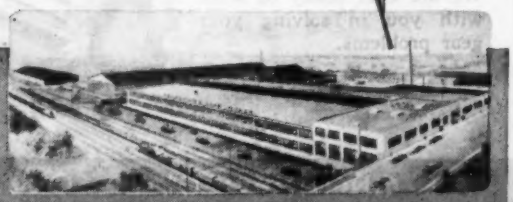
For 52 years we have specialized in manufacture of all types and sizes of gears. One of our special fields is mill gearing. We have the capacity to hob staggered-tooth herringbone type mill gears such as shown above up to 130 inch pitch diameter, 24 inch face and 1.25 diametrical pitch.

For the same diameter and face width the horsepower capacity and life of herringbone type gears are definitely superior to straight tooth spur gears. The tooth action is also smoother and when wear takes place the original involute form is maintained longer than for spur teeth.

Remember, though, we are equipped to produce all types of gears... let us give you unbiased recommendations to better meet your particular conditions.

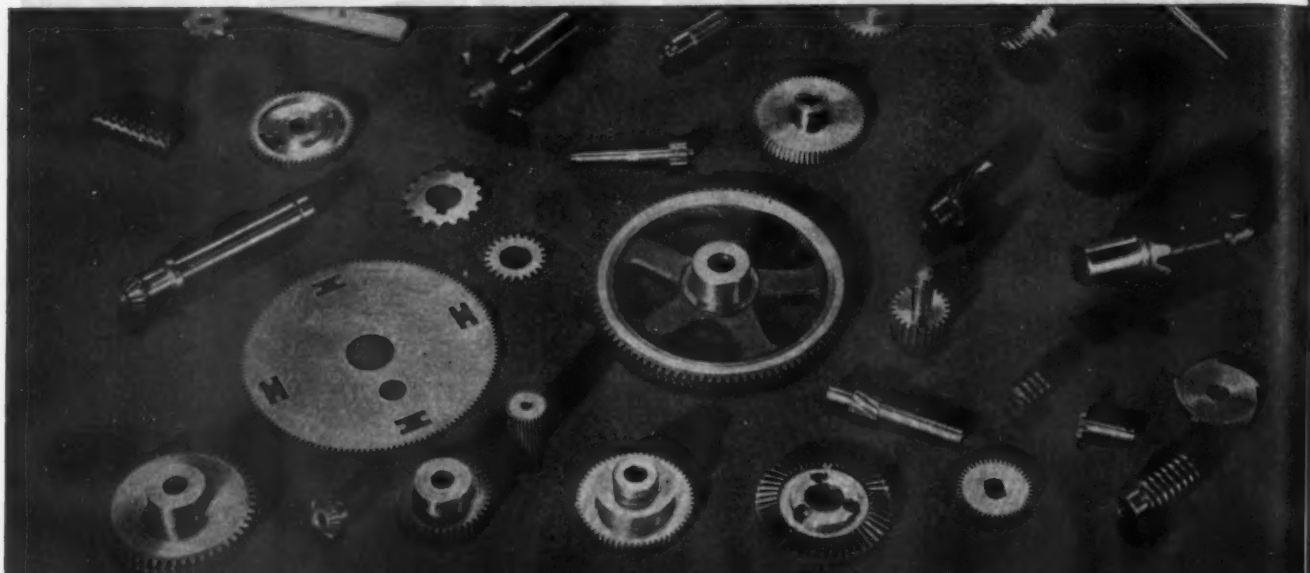
The Philadelphia Gear Catalog is full of helpful information for gear buyers. Write on your business letterhead for a copy.

Philadelphia
GEAR WORKS INCORPORATED
ERIE AVE. AND G ST., PHILADELPHIA 34, PA. NEW YORK • PITTSBURGH • CHICAGO



Industrial Gears and Speed Reducers
LimiTorque Valve Controls

Quaker City Gears Are Rolling with the Armed Forces on All Fronts



QUAKER CITY GEAR WORKS
1910-32 N. FRONT ST.
PHILADELPHIA, PA.

THERE'S ALWAYS A BEST *of* EVERYTHING . . . .

- ★ SPUR
- ★ BEVEL
- ★ HELICAL
- ★ SPLINE
- ★ WORM
- ★ SPECIAL

Follow the leaders . . . for they know the way! *Cincinnati Gears, Good Gears Only* are the choice of industry wherever outstanding performance is important.

Cincinnati precision made gears have the built-in strength, stamina, accuracy . . . everything, that long range performance must have to lower costs and increase profits. Remember, each Cincinnati Gear is made for your particular job . . . from your specifications.

We are ever ready to work with you in solving your gear problems.

THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio

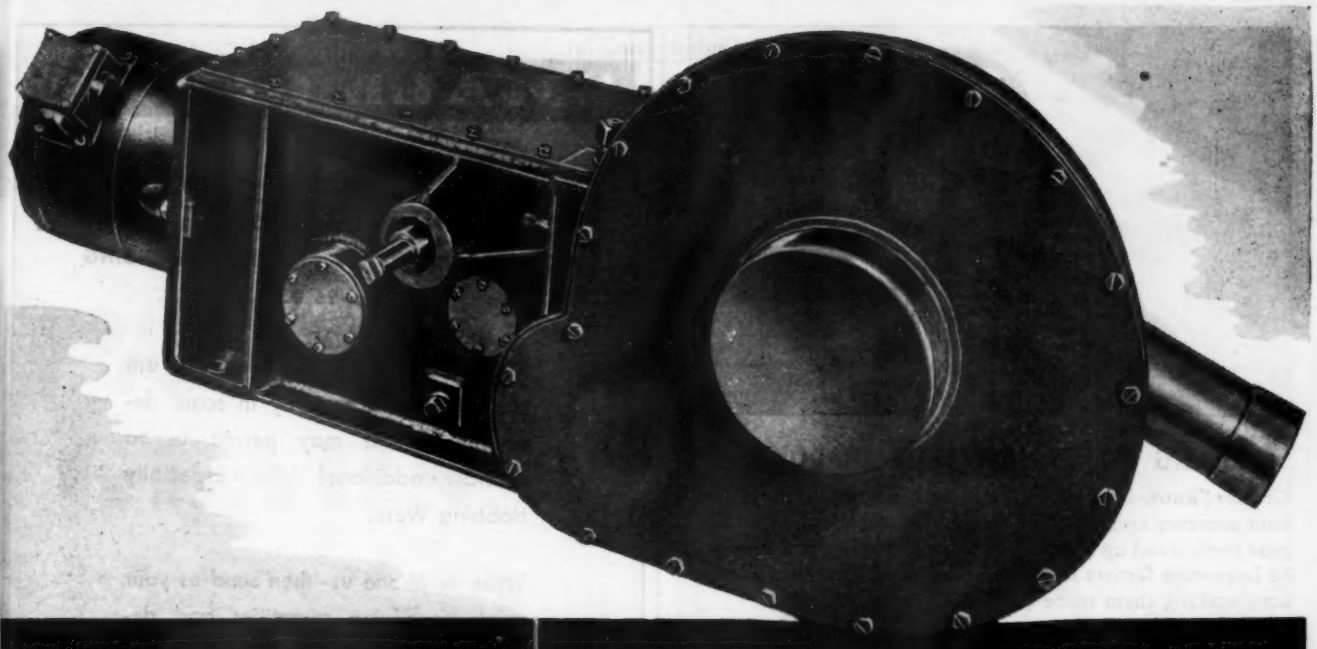
Try ATLANTIC

on that gear order

Many others have, to their lasting satisfaction. Full equipment, splendidly trained personnel, precision inspection, in spurs, helicals, worms, bevels, herringbones. Any gear material, including Micarta or non-metallic Bakelite. Any quantity. Any size to 60". Send us your specifications.

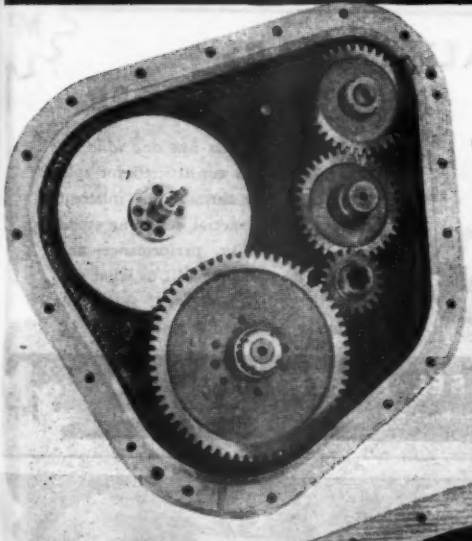
Write or phone us for quotations and delivery dates. Atlantic stock gear catalog including chains, sprockets, and reducers — on request.

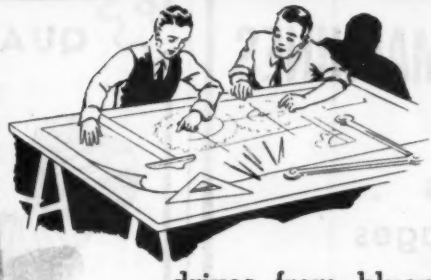
ATLANTIC GEAR WORKS
204 LAFAYETTE ST.
NEW YORK 12, N. Y.
Phone: CAnal 6-1440



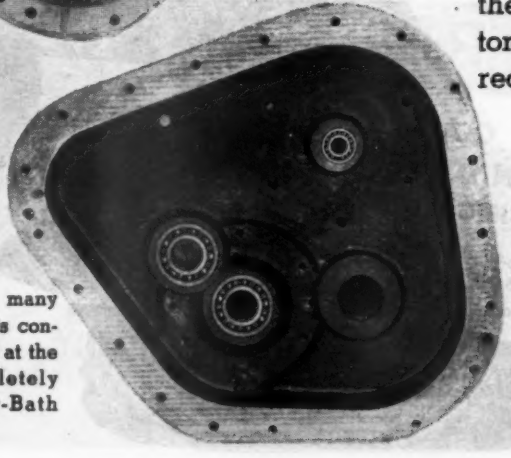
You get COMPACTNESS WITHOUT COMPLICATIONS in

Sier-Bath Gear Drives





Compactness and simplicity are characteristic of transmission units composed of Sier-Bath Gears. For we have engineered countless such drives from blueprint to final assembly. Our engineering staff designs or cooperates in the design of entire unit or gear train as desired. Our shop precisely machines, carefully heat treats and accurately assembles the gears—to the entire satisfaction of customers and customers' customers. Write us today, outlining your requirements.



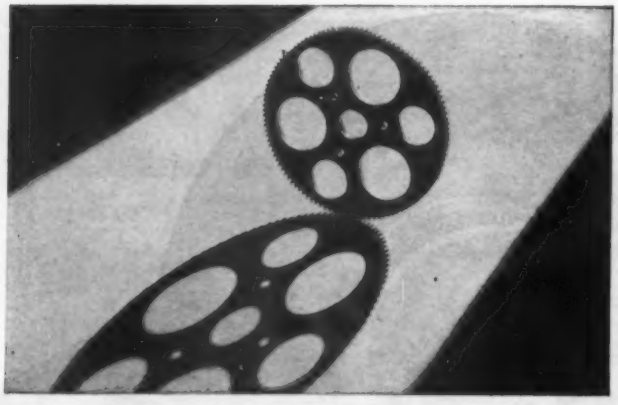
● One of the many transmission units constantly produced at the modern, completely equipped Sier-Bath shop.

☆ MANUFACTURING QUALITY PRODUCTS SINCE 1905 ☆

Sier-Bath Gear Co. Inc.

9252 HUDSON BOULEVARD, NORTH BERGEN, N. J.

9246



COMING EVENTS CAST THEIR SHADOWS—

Greater "know-how" in gear cutting methods has resulted in finer accuracy and finish without additional cost. As a result, gear teeth stand up longer and roll more quietly. These will be important factors in the gear design of your future products, making them more dependable and attractive.

Our services and experience will help you solve production problems on small or medium size spur, helical and rack gears, worms, splines, sprockets and ground threads. Write for quotation on your specifications. No obligation of course.

Beaver Gear Works Inc.

1025 PARMELE STREET, ROCKFORD, ILLINOIS

SMALL GEARS

HELICALS • SPURS • INTERNALS
BEVELS (Straight & Spiral)
WORM GEARING • THREAD GRINDING
(14 to 96 D. P.)

Altho heavy production schedules still prevail, they are spotty in some departments and may permit us to consider additional jobs—Especially Hobbing Work.

Write or phone us—then *send us your prints* specifying quantities and delivery requirements.

Gear Specialties

MANUFACTURERS

CHICAGO

2600 W. Medill Av. **Ph. Hum. 3482**

GEAR CUTTING MACHINES

New Design
New Features
New Advantages

NEWARK GEAR CUTTING MACHINE CO.
69 Prospect Street, NEWARK 5, NEW JERSEY
FRANK E. EBERHARDT, *President*

QUALITY GEARS CUT TO ORDER

● MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

MEISEL PRESS MFG. CO.
946 Dorchester Avenue Boston, Mass.

"HARTFORD"
GEARS • CAMS
THREAD GRINDING
. . . TO YOUR SPECIFICATIONS
When you come to "HARTFORD" you get what you order—without delay—at reasonable cost.
Send specifications—ask for quotations.
THE HARTFORD SPECIAL MACHINERY COMPANY
HARTFORD, CONN.

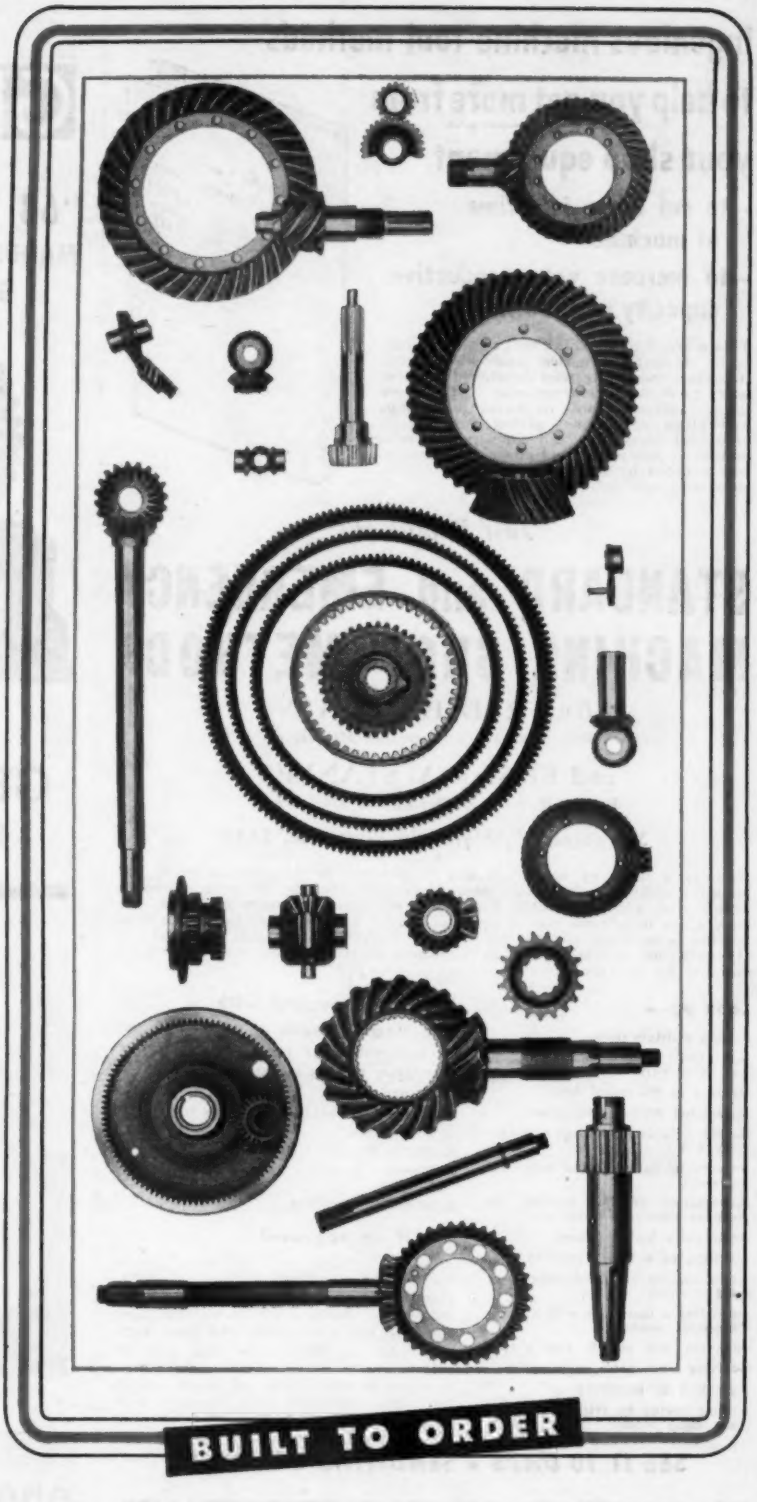
Precision GEARS

. . . in Production Quantities

● Manufacture of highest quality gear sets and power transmissions in production quantities is an Automotive Gear Works specialization. We build **BEVEL GEARS,** spiral, straight, hypoid and zerol tooth; **FLYWHEEL RING GEARS; SPUR GEARS,** straight and helical; and **GEAR SHAFTS.** These gears are quiet, smooth-running, long-life, precision products—cut to your own specifications—or performance-engineered to your specific requirements.

The men of our engineering staff may be helpful to you. They have had broad experience and are always available to assist in development of gears for new products, or redesign of gears in existing products—gears that will give maximum efficiency in service with corresponding economy in production.

For complete details on our facilities and abilities, please refer to the Automotive Gear Works 8-page catalog in *Sweet's Files* for *Product Designers* and *Mechanical Industries.* Inquiries from automotive, farm equipment, industrial, and marine equipment manufacturers are solicited—and are given prompt attention.



INDUSTRIAL • AUTOMOTIVE • FARM EQUIPMENT

Bevel Gears (SPIRAL, STRAIGHT, HYPOID, ZEROL) . . . **Spur Gears** (STRAIGHT AND HELICAL)

Flywheel Ring Gears . . . Gear Shafts

DOUBLE DIAMOND TRADE MARK GEARS

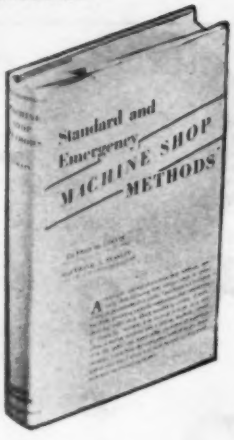
AUTOMOTIVE GEAR WORKS INC.

RICHMOND, INDIANA

Ingenious machine tool methods to help you get more from your shop equipment

—to cut down idle time of machines

—to increase your productive capacity and profits



This manual of machine tool methods gives both standard practice and also many ingenious substitute uses developed to meet war production emergencies. It covers many different jobs in turning, boring, and other operations, giving full details of actual cases in which time and trouble, and even complete hold-up of production, was avoided by applying machines to jobs they were not intended to handle.

Just Published!

STANDARD and EMERGENCY MACHINE SHOP METHODS

By FRED H. COLVIN
Editor, Emeritus, *American Machinist*

and FRANK A. STANLEY
Editor, *Western Machinery and Steel World*

333 pages, 5½x8½, fully illustrated, $3.50

Here is a mine of ideas for any machinist, in devising methods for handling difficult or unusual jobs. More than this, by showing scores of usable and adaptable ideas for using machines in different ways, the book gives invaluable aid to the shop owner and operator in saving production time when the normal machine for the job is laid up, busy, or otherwise not available, and in profitably increasing the variety of work handled by his shop.

Look up—

- —using multiple tools
- —building special machines from standard units
- —boring on the radial drill
- —mounting drills upside down
- —using weights for feeding spot-facing tool
- —turntable fixture made from old flywheel
- —improvised drilling machine for marine stern-tube liners
- —emergency boring fixtures
- —milling on a boring machine
- —gear cutting on a horizontal boring machine
- —grinding a taper hole with a flexible-shaft machine
- —unusual jobs on the gear shaper
- —cutting large gears on a slotter
- —profiling by broaching
- —metal sawing by frictional heat—and many others

8 sections packed with practical ideas—

1. Standard Machine Tools
2. Standard Methods and Machines
3. Making Holes
4. Boring Machines and Boring Mills
5. Lathe Work
6. Milling Practice
7. Planing, Slotting, Shaping, and Machine Forging
8. Grinding Operations

See it on approval

With the scores and scores of ideas for boring, turning, milling, planing, grinding, and other jobs at hand for reference, every one from the boss down to the apprentice will find ways of doing the hard jobs and will be able to adapt many of the suggestions to entirely new kinds of work. Send for this valuable book today, and widen your field of operations.

SEE IT 10 DAYS • SEND THIS COUPON!

McGRAW-HILL ON-APPROVAL COUPON

McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

Send me Colvin and Stanley's Standard and Emergency Machine Shop Methods for 10 days examination on approval. In 10 days I will send $3.50 plus few cents postage or return book postpaid. (We pay postage on orders accompanied by cash remittance; same return privilege.)

Name .....

Address .....

City and State .....

Company .....

Position ..... A 7-19-45

GRANT GEARS

"64 YEARS" MANUFACTURING GEARS

Despite the continued growth of our gear business we are still in position to give each customer the attention they have a right to expect.

We carry a complete stock of standard cut gears and can furnish special gears to your specifications.

GRANT GEAR WORKS
BOSTON, MASS.
ESTABLISHED 1877 — GEAR — BY GEO. B. GRANT

GEARS TO ORDER

Spiral and helical gears; special couplings, bushings and collars; pins, pulleys and rollers. Made to your specifications—*promptly.*

KELLEY GEAR & TOOL CO.
Bristol, Tennessee

PROCESS Gear COMPANY

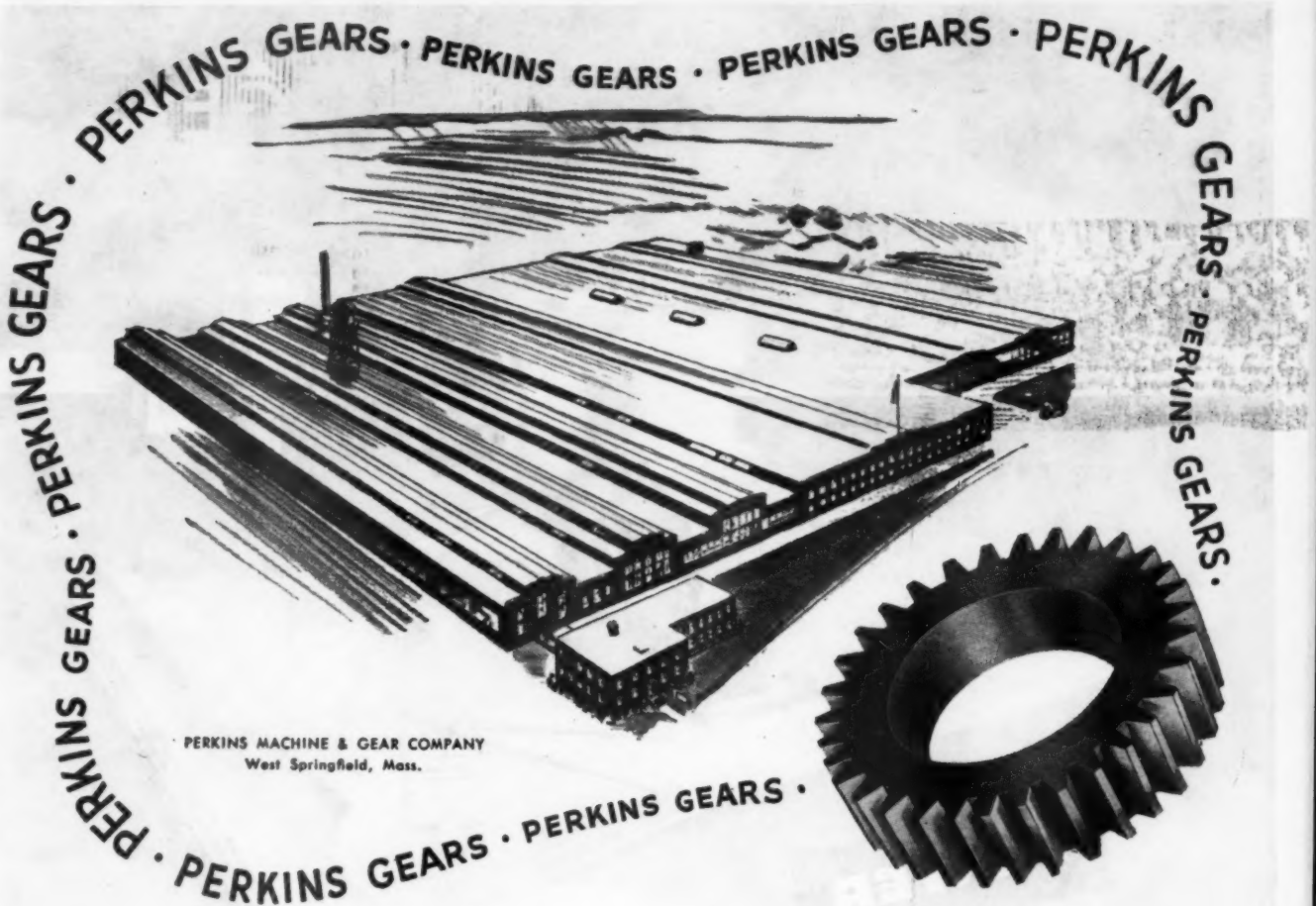
- **SPURS**
- **SPIRALS**
- **WORMS**

Exclusively in the Fine Pitches

- *Specialists in Hobbing, Thread Milling, Thread Grinding, and Split Gear Fabrication.*

Ask us for complete information—get all facts

4622 FULLERTON AVE. CHICAGO 39, ILL.


PERKINS GEARS · PERKINS GEARS · PERKINS GEARS · PERKINS GEARS · PERKINS GEARS · PERKINS GEARS · PERKINS GEARS · PERKINS GEARS · PERKINS GEARS ·
PERKINS MACHINE & GEAR COMPANY
West Springfield, Mass.

a peacetime reputation *strengthened* under stress

In the twenty years prior to this war, precision gears custom-cut by Perkins became integral parts in a steadily mounting number of products. In due course, Perkins—as a source of supply—was accorded preferential status among hundreds of nationally and inter-nationally known manufacturers.

When industry converted to production for war, the time-tested craftsmanship of Perkins continued to be relied upon for the production of high-precision gears to Government specifications. This challenge was met.

High precision gears, meeting the most severe engineering requirements, are now being produced by Perkins in vast quantities. The many new techniques developed by our engineers to make this possible may be of great value to many manufacturers *right now*. You furnish the specifications . . . we'll produce the gears.

PERKINS MAKES:

Helical Gears *Bevel Gears* *Ratchets*
Worm Gears *Spiral Gears* *Spur Gears*
Ground Thread Worms

PERKINS PRECISION, CUSTOM-CUT GEARS

PERKINS MACHINE & GEAR COMPANY, SPRINGFIELD 2, MASS.

Out of the war has come a new idea in the application of power. In cooperation with aircraft manufacturers, Foote Bros. engineers have developed small power units, compact in size, light in weight, yet exerting tremendous force. These power units are designed for accessory drives and to open and close ventilators, trim stabilizers, operate wing flaps, and perform many other jobs that otherwise would have to be done manually.

Right now in development in the laboratories at Foote Bros. are other applications of these power units—applications on peacetime machines and equipment—that will mean more efficient operation—that will result in definite competitive advantages.

Briefly, these packages of power can actuate linear or rotary motion positively, either by direct or remote control. They may be designed to have an operating force of a few pounds or several tons—they may do one job or simultaneously perform many.

For the machines or equipment you are manufacturing or planning to manufacture, Foote Bros. power units may assure you greater operating efficiency, more compact design, lighter weight, or better engineering. They may simplify your design problems and even make a design practical that without them would be impractical.

Foote Bros. engineers will gladly discuss the application of power units to your equipment.

A copy of this informative product engineering manual on "A-Q" gears will be sent to you on request.

FOOTE BROS. GEAR AND MACHINE CORPORATION, Dept. E, 5225 S. Western Blvd., Chicago 9, Ill.

FOOTE BROS.

Better Power Transmission Through Better Gears

48 AIRCRAFT PRECISION

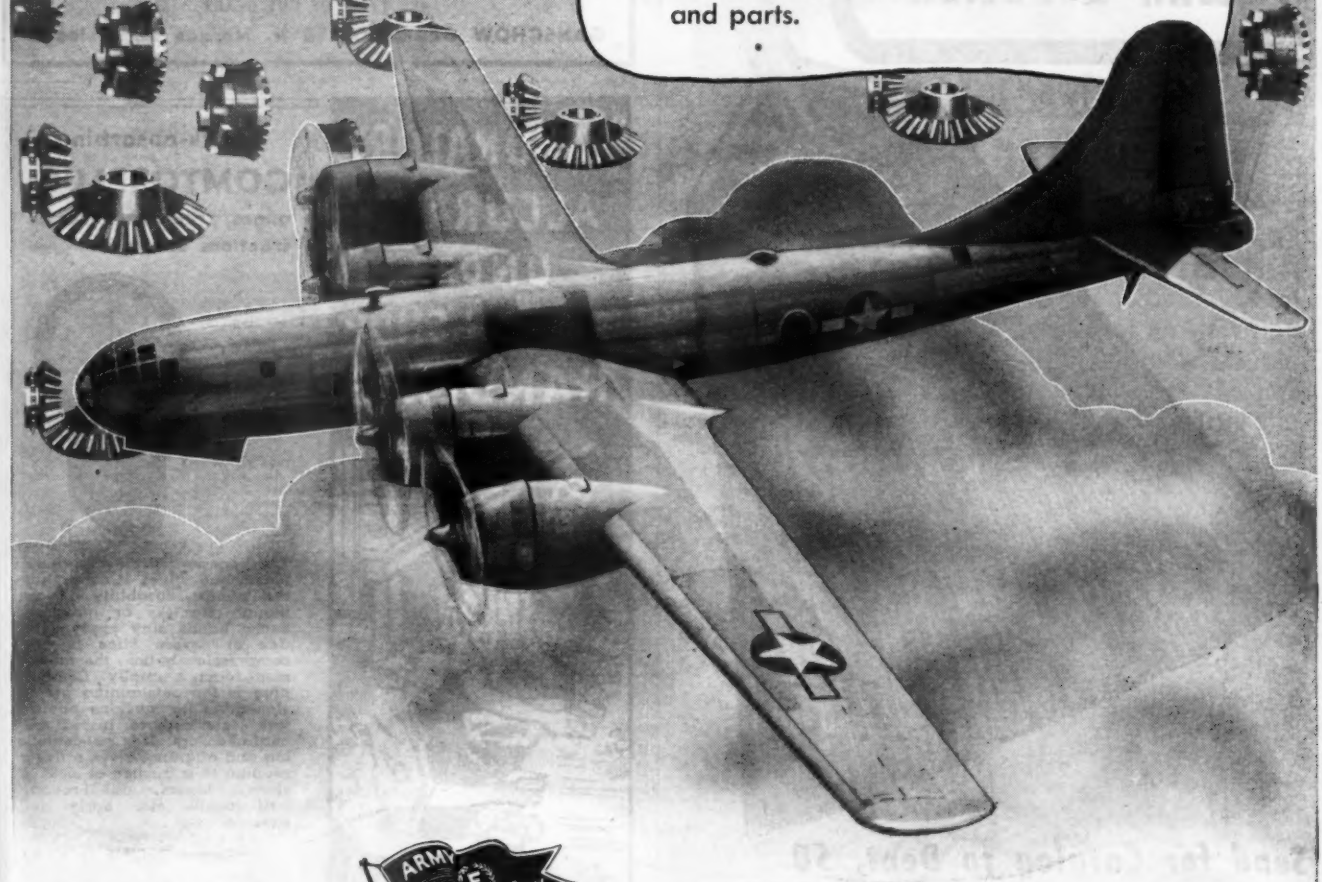
Brad Foote Gears

Fly with the B-29

When you are carrying a bomb load heavier, faster and higher than any ever carried before, the gears operating the controls, among other components, must be the best—perfect.

The glorious performance of the B-29 Superfortress shows that they are laying them down in the right places.

The Brad Foote Gear Works is proud to have had a part in supplying parts from the start for this wonderful ship and to have contributed with its skills in the manufacture of precision gears and parts.



ARMY E NAVY

BRAD FOOTE GEAR WORKS

1309 So. Cicero Avenue
Department P
CICERO 50 ILLINOIS

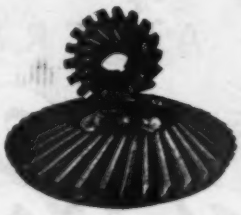
The Famous
FULLER FIBER BROOM
THE FINEST TOOL OF ITS KIND

A SIZE AND WEIGHT FOR EVERY NEED

FLOOR BRUSHES
SCRUB BRUSHES
DUST BRUSHES
WET MOPS
DRY DUSTING MOPS
MACHINE BRUSHES
WAX & POLISH

Send for Catalog to Dept. 50

THE FULLER BRUSH COMPANY
INDUSTRIAL DIVISION · HARTFORD 2, CONN.



ALL TYPES
ALL MATERIALS

BILGRAM BEVEL GEARS
Straight — Spiral Teeth

BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

BRAWNY GEARS
PROMPT
ECONOMICAL SERVICE
ALL TYPES, MATERIALS
AND QUANTITIES
Ask for Estimate

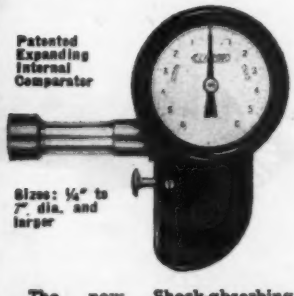
BRAUN GEAR CO., 1590-1608 Atlantic Ave., Brooklyn, N. Y.

GANSCHOW GEARS
FOR SIXTY YEARS

Spur—SPEED REDUCERS—Worm
ALL TYPES OF CUT GEARS
GANSCHOW GEAR CO., 18 N. Morgan St., Chicago

"LABORATORY ACCURACY" UNDER ROUGH SHOP HANDLING

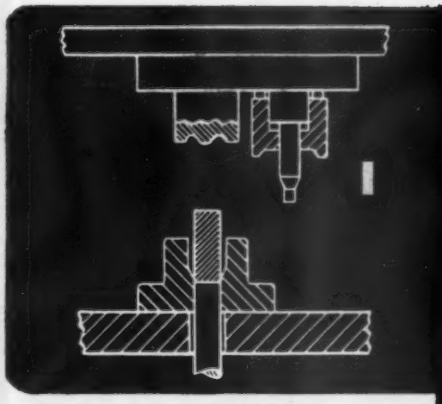
Shock-absorbing
COMTORPLUG
gages precision bores to fractions of .0001"

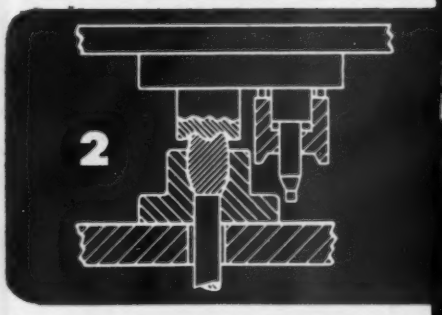


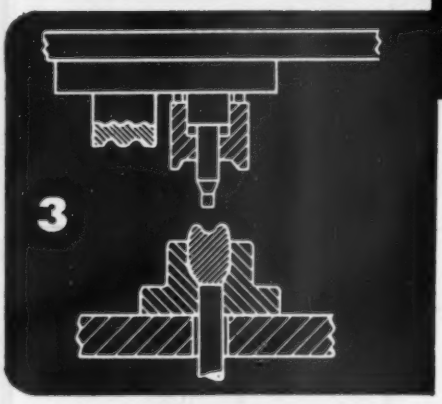
The new Shock-absorbing Movement gives Comtorplug the utmost durability. Even though careless or inexperienced hands may apply sudden or severe force to the compression button, the movement reacts normally. Comtorplug is the outstanding precision gage for machine operators, intermediate inspectors, final checkers. It is self-centering and aligning, gives a fixed reading to a fraction of .0001", shows tapers, out-of-round, bell mouth, etc. Early deliveries.

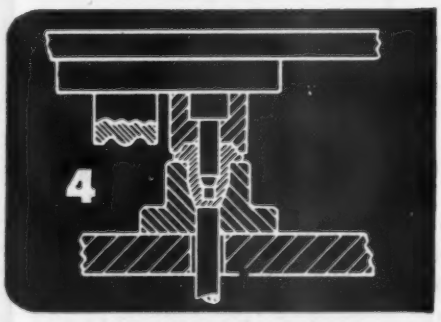
Request Bulletin 31

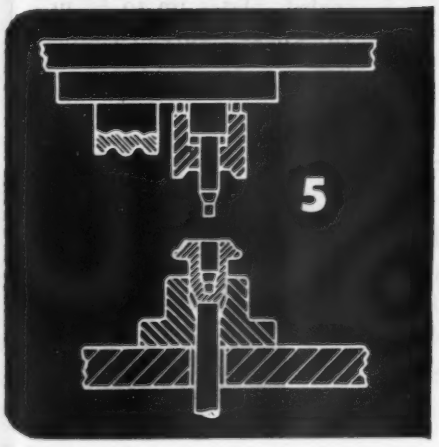
THE COMTOR CO.
68 RUMFORD AVE.
WALTHAM MASS.

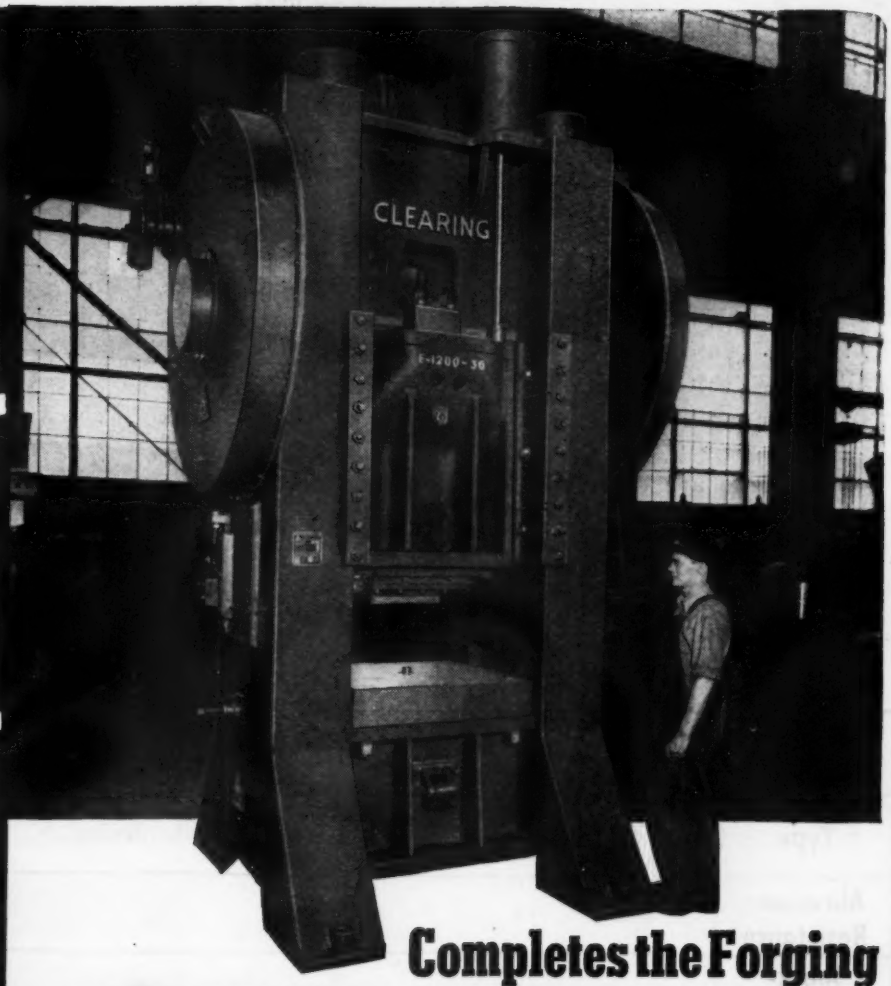












Completes the Forging
WITHOUT HANDLING

By shuttling the upper die on alternate strokes this Clearing 200-ton press performs two hot forging operations without requiring movement of the work in or from the lower die. The actuating mechanism is an integral part of this Clearing press, and is typical of the way Clearing presses help attain faster, more accurate, trouble-free press performance.

This Clearing Forging Press was built for the Hughes Tool Co., Houston, Texas. With an 8" stroke, it has an operating capacity of 50 strokes per minute. Cam-actuated stripper in the slide and an air-actuated knock-out in the bed are part of the equipment of this press. An automatic cycle of two strokes produces each forging.

Whatever your product or production setup may be, your operations can be more profitable if you take advantage of what Clearing can do for you. Investigate how Clearing presses increase production, work to closer tolerances, and often handle jobs never before entrusted to presses. Write today for press details and information, based on your own requirements.

CLEARING MACHINE CORPORATION,
6499 W. 65th St., Chicago 38, Ill.

ARMY E NAVY

CLEARING ★

MECHANICAL AND HYDRAULIC PRESSES
FOR SUCH OPERATIONS AS DRAWING + BLANKING + FORMING + FORGING

Aristocrats of Die Steels

LEHIGH S · LEHIGH H · LEHIGH L

Here are three blue-ribbon die steels that have several things in common: *top production, high abrasion-resistance, and an absolute minimum of distortion and dimensional change under heat-treatment.* All are members of the high-carbon, high-chromium group, yet each has its own characteristics, each its separate uses. Briefly, these are as follows:

Grade	LEHIGH S	LEHIGH H	LEHIGH L
Type	Oil-hardening	Air-hardening	Oil- or air-hardening
Abrasion-Resistance	1*	2*	3*
Shock-Resistance	3*	2*	1*
Primary Alloying Elements	C 2.05 Cr 12.00 V 0.60	C 1.65 Cr 11.50 V 0.40 Mo 0.80	C 0.85 Cr 11.50 V 0.30 Mo 0.45 Ni 1.00
Typical Uses	Blanking, punching, forming, and thread-rolling dies; lamination dies for high-silicon sheets; shear blades and rotary slitters for thin-gage material (pickled or cold-rolled).	Blanking, punching, and forming dies; master tools and hobs; mandrels, gages, taps; bending or forming rolls.	Punching, forming, and trimmer dies; flying shear blades for continuous sheet and strip mills (sheets, bright and unpickled or unscaled; plates up to ½ in. thickness); thread-rolling dies.

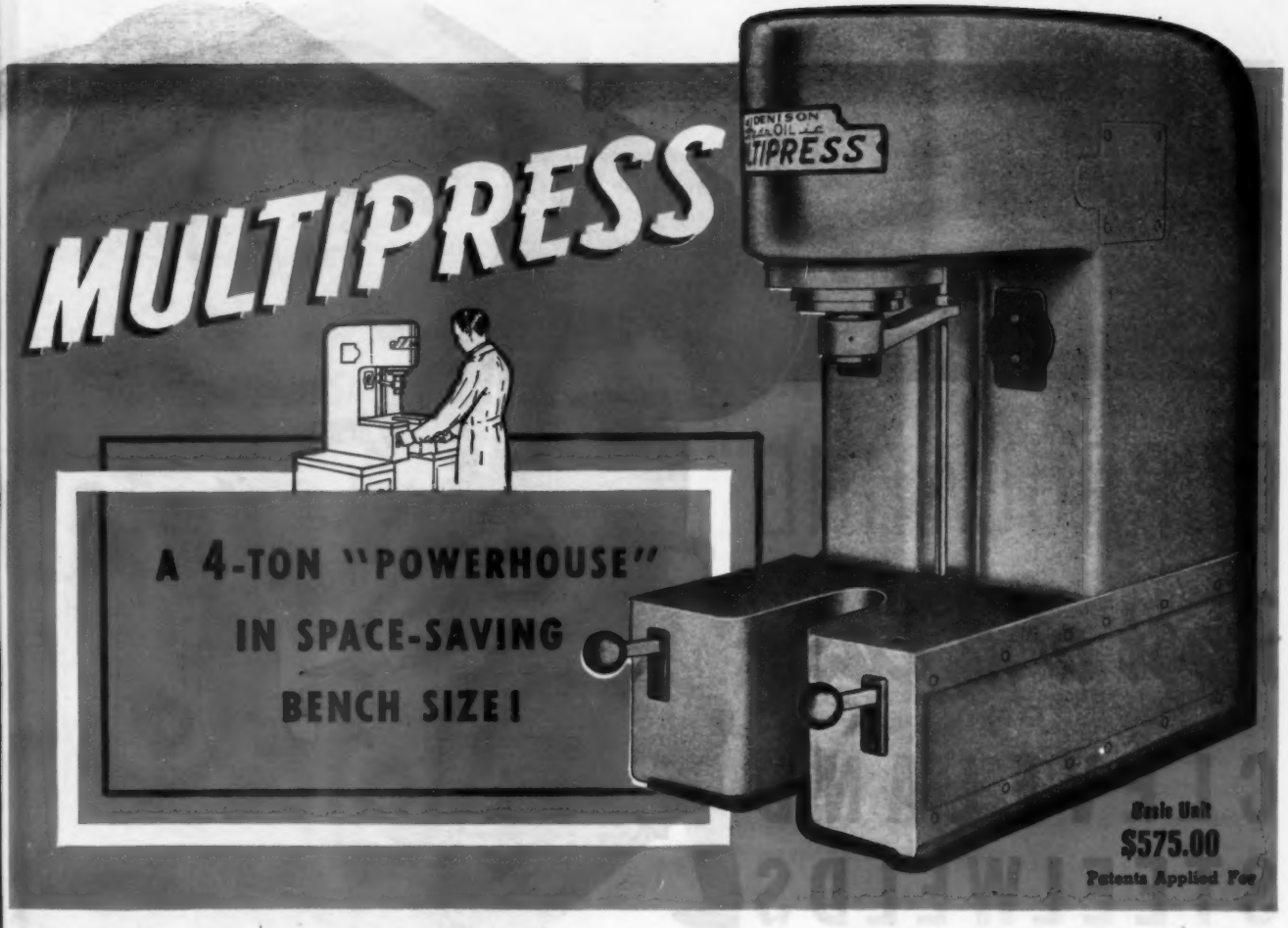
*1—*Highest of group.* *2—*Medium.* *3—*Lowest of group.*

These three steels are aristocrats of the tool room; yet none of the three is a "fussy" steel, none is hard to handle. Once you've stocked and used them, they'll always have a place in your inventory. Ask your Bethlehem distributor for further details.

★ BETHLEHEM STEEL ★

Bethlehem Steel Company, Bethlehem, Pa. • Bethlehem Steel Export Corporation, New York City

MULTIPRESS

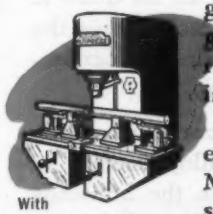


MULTIPRESS is the answer to an amazing range of production needs in one compact, space-saving unit! For example, it gives you:

- *Ram pressures from 300 to 8,000 pounds . . . and you can closely limit them anywhere in that range!*
- *Length of ram stroke easily adjustable from 1/16-inch to six inches!*
- *Ram speeds up to 200 inches per minute downward, and 300 inches per minute upward.*
- *Full "feather-touch" control of ram travel and pressure at all times—plus many other controls.*
- *A completely self-contained, motor-driven, oil-hydraulic machine tool! Easily portable. Delivered ready to connect and operate, after installation of a motor-starter.*
- *Built for a wide range of standard accessories that further broaden the applications of the basic Multipress.*

MULTIPRESS is 16 inches wide, 26 inches deep, and 34 inches high, weighs only 725 pounds, and has a table area of 10½ x 16 inches, which can be increased to 10½ x 32 inches with table extensions.

The ram responds instantly to the slightest movement of the control levers—may be lowered rapidly or slowly, or stopped anywhere in its downward travel while the work is positioned beneath it. Pressures can be increased gradually or applied in full at once. The gauge shows pressures exerted on the ram in both tons and pounds per square inch.


With Straightening Fixtures

Multipress fixtures are available for efficient, high-precision straightening. Matching benches, table extensions, side shelves, a variety of bolster plates, and special ram action controls are also among the standard Multipress accessories. The Denison Engineering Co., 1164 Dublin Road, Columbus 16, Ohio.

Write for This Free Booklet on MULTIPRESS

This 12-page book gives you full details on Multipress, its operation, and accessories. Let us send you a copy!

Industry's Right Hand

DENISON EQUIPMENT in APPLIED HydrOILics

CORRUGATING

Fast and Easy

ON

CLEVELAND STEELWELDS

LARGE corrugations are made singly and smaller corrugations several at a time, quickly and easily with Cleveland Steelweld Bending Presses. This work can be done to hairline accuracy. With the proper dies the corrugated metal will not curl; the corrugation tops will lie in a flat plane.

The press illustrated will corrugate steel, aluminum and the many alloy metals in lengths up to 10 feet between the housings of the machine. Other Steelwelds will handle various lengths up to 20 feet.

Corrugating is only one of the many types of work that can be handled on Steelwelds. These versatile machines are equally advantageous for bending, pressing, punching, blanking and drawing operations. This makes them especially desirable in shops where the work is varied. With a quick change of dies and simple adjustment of the ram stroke, a Steelweld is ready for an entirely different run of work.

If you are giving any thought to the future, now is the time to investigate the many possibilities of this all-around tool.

GET THIS BOOK!
CATALOG No. 2002 gives complete construction and engineering details. Profusely illustrated

THE CLEVELAND CRANE & ENGINEERING CO.
1127 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND
STEELWELD PRESSES
BENDING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

Can you produce this part... without machining?

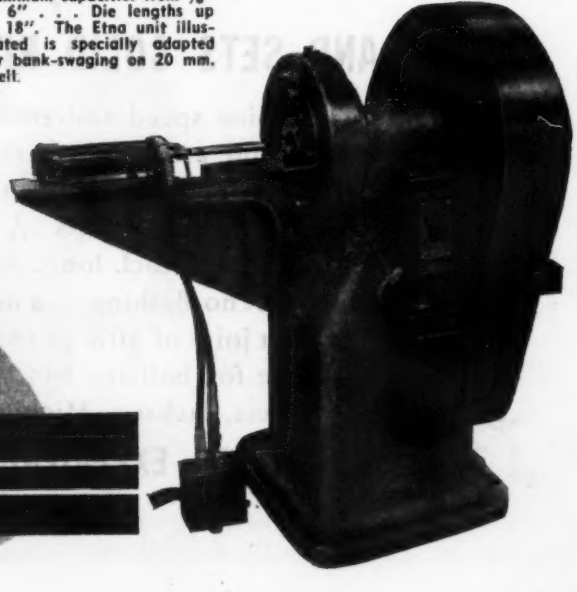
Sixth in a series, showing the use of Swaging techniques in war production.

ETNA SWAGING UNITS
Can... and do!

Tapering, sizing and reducing operations of almost any description can be done faster, more efficiently and in many cases without preliminary machining on ETNA Swaging Machines. Swaged parts are stronger too—this because no metal is cut away. Instead it is compressed, thus improving the metal structure. Finishing time is reduced because of the smooth surface Swaging produces. This is an important advantage in meeting close tolerances.

We'll be glad to describe the advantages of ETNA Swaging Machines as they will affect and improve your production. Write, describing your operations.

Etna Swaging Machines are built in standard sizes with maximum capacities from 3/8" to 6" . . . Die lengths up to 18". The Etna unit illustrated is specially adapted for bank-swaging on 20 mm. shell.



IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING

"Ask ETNA about Swaging"

The ETNA Machine Co.

3400 MAPLEWOOD AVENUE

TOLEDO 10, OHIO

Cut costs...save time with T-J RIVITOR

Automatically

FEEDS AND SETS SOLID RIVETS

Bring production-line speed and efficiency to your riveting and assembly operations —with the T-J RIVITOR! Automatically feeds and sets solid steel rivets $\frac{1}{16}$" to $\frac{1}{4}$" dia. incl., and up to $\frac{7}{8}$" incl. long. Assures a completely filled hole... no flashing... a neat, balanced head. Makes a solid rivet joint of 10% to 15% greater strength. Rugged, dependable. Write for bulletin 544. The Tomkins-Johnson Co., 601 Mechanic Street, Jackson, Michigan.

28 YEARS EXPERIENCE...

TOMKINS-JOHNSON
RIVITORS
T-J

HYDRAULIC PUMPS

For Group Operation of Hydraulically Powered Equipment

Elmes vertical three-plunger pump, Model No. 6293, made in sizes from 3 to 100 h.p. Forged steel body; anti-friction bearings; extra large crank pin; deep stuffing boxes; nitrided plungers; renewable valve seats; stainless alloy valves.

Why does hydraulic pressure as a source of power face such a *rosy future?* Because this irresistible fluid force has had a *remarkable past!*

Hydraulic pressure truly performs production *miracles,* and it has kept pace with industrial progress throughout the entire period of America's *phenomenal industrial development.* Elmes hydraulic equipment has served industry for nearly a *century.* The first Elmes high-pressure pumps were made more than *fifty years ago.*

Today's production records would have been impossible without thorough dependability in the units that supply sure fluid power—*the high-pressure pumps.* Pumps, too, have kept pace with progress.

Master of any situation is the Elmes six-plunger pump shown below. Modern Elmes high-pressure pumps cover the *full range* from hand operation to pressures as high as 35,000 p.s.i.

Send for Bulletin 1020—"Elmes High-Pressure Pumps," and ask us to include companion bulletin No. 5100—"Elmes Air-Ballasted Accumulators." Today is none too soon to plan on *cutting costs.*

ELMES HYDRAULIC EQUIPMENT

Elmes horizontal six-plunger pump, Model No. 5935, made in sizes from 150 to 500 h.p. Opposed plungers; heavy, one-piece housing; anti-friction bearings throughout; enclosed herring-bone gears; renewable valve seats; needle-bearing wrist pins; pressure and splash lubrication.

ELMES ENGINEERING WORKS *of* AMERICAN STEEL FOUNDRIES, 1001-1013 W. Fulton St., Chicago 7, Ill.

Also Manufactured in Canada

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES

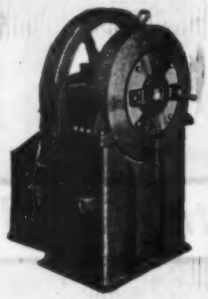
● In addition to making a complete line of standard die sets, we are especially well equipped to produce special die sets to your specifications. Send us your prints for prompt action—or call the "Detroit" man in your area.

DETROIT DIE SET CORPORATION
2895 W. GRAND BLVD. DETROIT 2, MICH.

★ CALL "DETROIT" ★

DETROIT	TR 2-5150
INDIANAPOLIS	LI 3884
MINNEAPOLIS	AT 5264
DAYTON	HE 3042
TOLEDO	GA 5706
SEATTLE	SE 2090
PORTLAND, Ore.	AT 1466
SAN FRANCISCO	MA 8532
BUFFALO	PA 9206
PHILADELPHIA	VIC 4084
ROCK ISLAND, Ill.	RI 743

DETROIT DIE SETS ★



THE
TORRINGTON
ROTARY
SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

The Torrington Co., Swager Dept.
56 Field Street Torrington, Conn.

STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

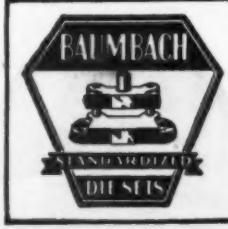
Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.

straight side press

ZEH & HAHNEMANN CO.
180 Vanderpool Street
NEWARK N. J.

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
The V & O Press Company, Incorporated
HUDSON, NEW YORK



BETTER-MADE
DIE SETS
AT LOWER COST

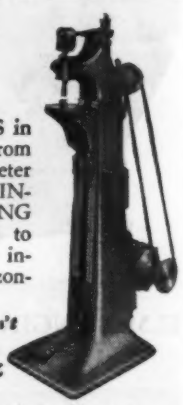
46 Styles—195,000 Sizes

E. A. BAUMBACH MFG. CO.
Machined Steel Semi-Steel
Send for our new catalog
1812 South Kilbourn Ave., Chicago, Ill.

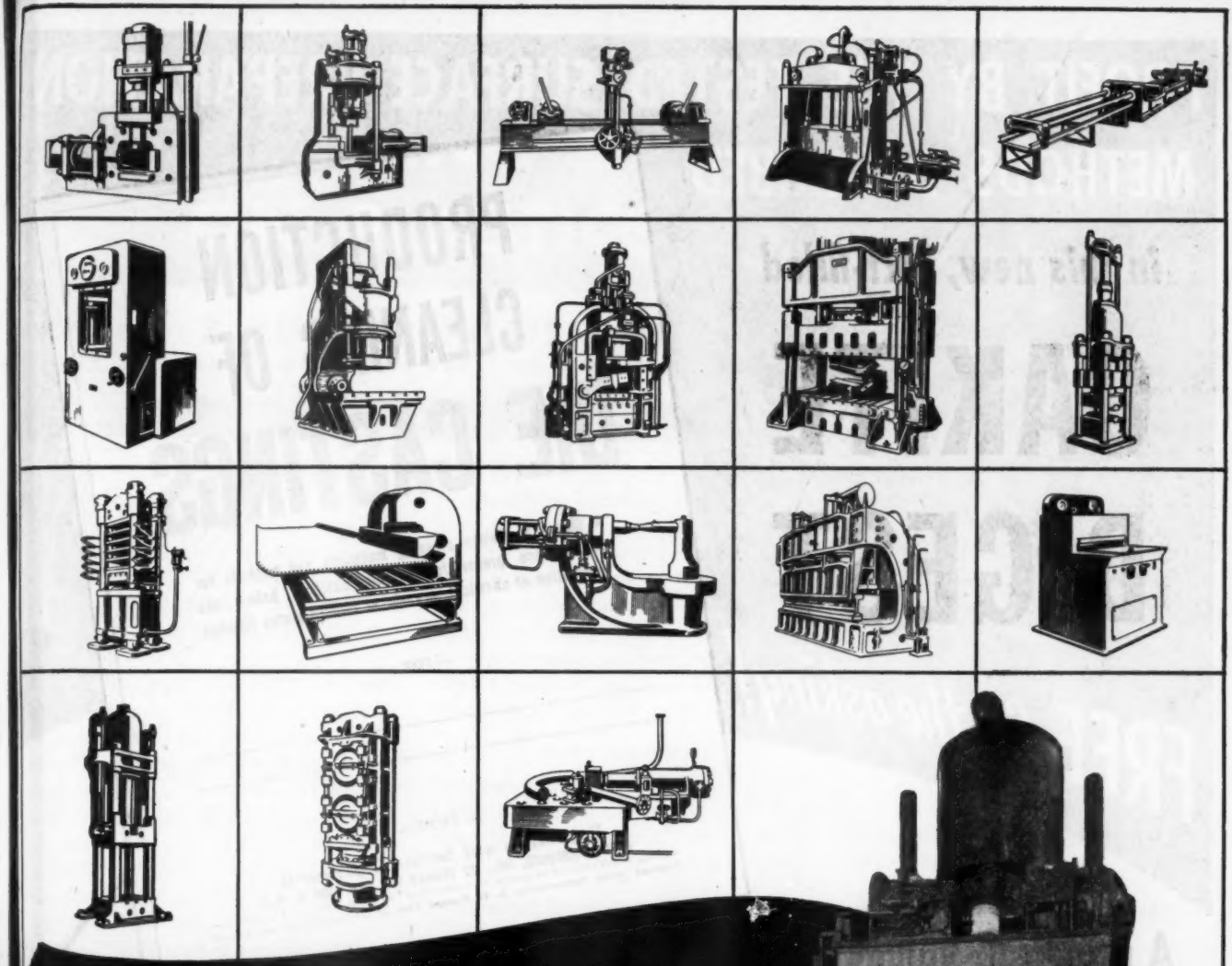
GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

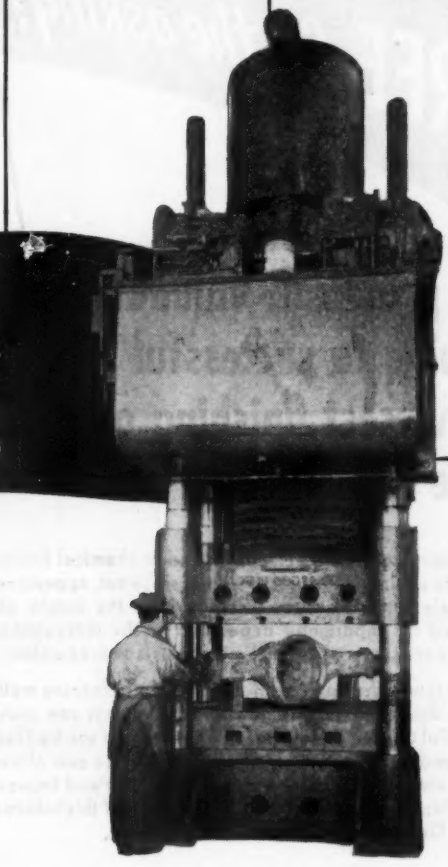


THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.



Every Modern Shop Needs

A HYDRAULIC PRESS



750 TON STRAIGHTENING PRESS

Any new equipment bought today should be selected with *two* thoughts in mind . . . its value in meeting production needs now, and meeting competitive conditions tomorrow.

When you're thinking along those lines, you're bound to find situations where a hydraulic press is the logical answer. There are dozens of jobs around the shop that presses can do faster, better, and cheaper. Often an entire series of expensive, time-consuming operations can be eliminated by one trip through a press. Presses have helped work a lot of the miracles in wartime production, and they are excellent insurance against the future when profits will depend on production savings.

Baldwin engineers have built hundreds of different presses, to meet all kinds of needs. This experience is available to help you solve your particular problem. The Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia 42, Pa., U.S.A. Offices: Philadelphia, New York, Chicago, Washington, Boston, Cleveland, St. Louis, San Francisco, Houston, Pittsburgh, Detroit.

Hydraulic presses, Testing equipment, Steel forgings and castings, Diesel-electric locomotives, Diesel engines, Metal plate fabrication, Rolled steel rings, Bronze castings, Heavy machine work, Crane wheels, Bending rolls, Plate planers, Babbitt metal, Alloy iron castings, Briquetting presses.

BLW THE BALDWIN GROUP **BALDWIN**

HYDRAULIC PRESSES

PROFIT BY THE TESTED SURFACE PREPARATION METHODS DESCRIBED

in this new, fact-filled

OAKITE DIGEST

FREE for the asking!

PRODUCTION
CLEANING OF
DIE CASTINGS
A digest of Oakite cleaning materials and methods for the surface preparation of die castings before the application of chemical, organic or electro-plated finishes
— FOR —
— FROM —
Engineering and Service Departments
OAKITE PRODUCTS, INC., 22 THAMES ST., NEW YORK 6, N.Y.
In Canada: OAKITE PRODUCTS OF CANADA, LTD.—TORONTO: 45 Front St. East—MONTREAL: 1 Van Horne Ave
Technical Service Representatives in All Principal Cities of the United States and Canada

A practical, valuable guide to successful low-cost finishing of die cast alloys

In applying organic, electro-plated or chemical finishes to die castings for protective purposes, wear, appearance or sales apeal, experience shows that the results obtained are importantly dependent on the thoroughness and correctness of the preliminary surface preparation.

That is why the many plant-tested Oakite cleaning methods described in this new Oakite Digest can prove helpful to you. All are based on successful use by leading producers and users of all types of die cast alloys. All are helping to lower production cost and improve finishing results. Send for a FREE copy of this informative Digest today. It's yours for the asking.

Partial List of Contents

- Cleaning aluminum die castings before organic finishing
- Alkaline and solvent methods
- Stripping anodizing film
- Cleaning zinc die castings for chemical and plated finishes
- Cleaning before dichromating
- Cleaning before Bonderizing
- Electro and mechanical cleaning methods on magnesium die castings
- Cleaning antimonial lead alloy castings
- Cleaning brass, bronze and copper alloy castings
- Cleaning tin alloys, Brittania metal, white metal
- Cleaning die casting machines, steel dies
- Stripping black finishes from non-ferrous die castings

OAKITE PRODUCTS, INC., 24 THAMES STREET, NEW YORK 6, N. Y.

Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE CLEANING

MATERIALS METHODS SERVICE

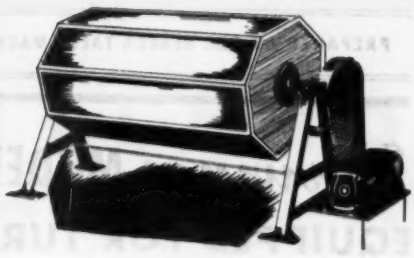
Buy Bonds for Victory

FOR EVERY CLEANING REQUIREMENT

MACHINING DATA ON PLASTICS

7. TUMBLE POLISHING

(PART TWO OF TWO PARTS ON TUMBLING)



This is the seventh in a series of messages designed to better your knowledge about the machining and finishing of parts molded of phenolics—the most versatile of all plastics... the type of plastics which Durez has specialized in producing for the past quarter century.

As a general rule, molded Durez parts have a brilliant, lustrous finish on completion of the cure. However, requirements sometimes call for an even finer finish than that obtainable from the mold surface. In this latter instance, it becomes necessary to polish the parts on buffing wheels or in tumbling barrels. On large parts, the wheel method should be employed. On small parts, the tumbling method can be used to excellent advantage from the standpoint of economy and simplicity.

Recommended Procedure

When greater gloss or lustre is required on small parts such as buttons and closures, a method called "coloring" is employed. This procedure is as follows. In a hardwood tumbling barrel, similar to the one illustrated, are placed wooden shoe pegs or sawdust particles which have been saturated with a preparation of carnauba or paraffin wax dissolved in hot turpentine (in some cases Fullers' earth is also added). The wooden pegs or sawdust particles are then tumbled until a satisfactory coating of the wax preparation has been obtained. After this has been accomplished, the barrel is loaded to about 80% capacity with equal amounts by volume of molded parts and prepared pegs or sawdust. Be careful of using too small a charge as it may cause overheating and wax separation from the pegs. This usually results in an inferior polish.

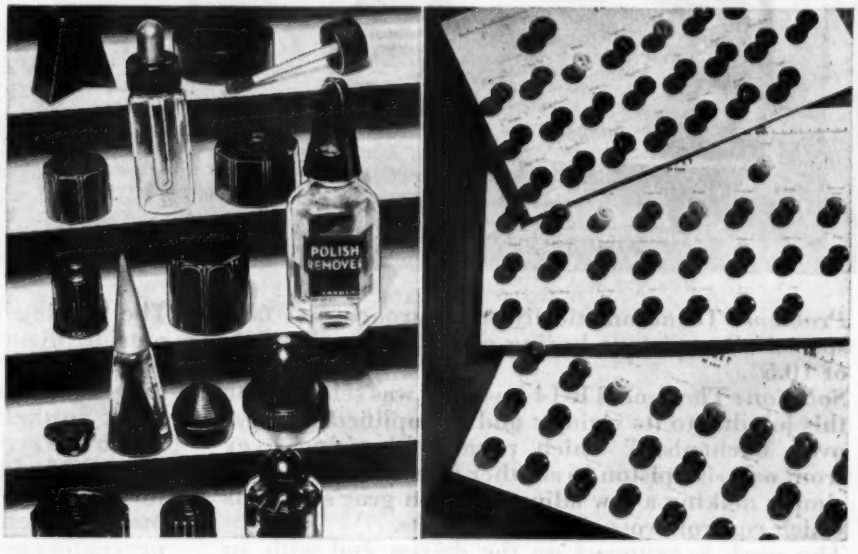
Time Element

Recommended speeds for tumble polishing range from 15 to 30 r.p.m. The time required depends entirely upon conditions such as type of wax used, type of material tumbled, and various other factors. Normally, about 6 hours tumbling time is required to obtain a lustrous finish on a molded Durez phenolic part.

Expert Assistance Available

The benefits of the vast experience which Durez technicians have acquired during the past quarter century are available at all times towards furthering your progress in the machining and finishing of phenolic plastics. Durez Plastics & Chemicals, Inc., 537 Walck Road, North Tonawanda, N.Y.

The lustrous finishes of these molded Durez closures and buttons are the result of tumble polishing.



DUREZ

PHENOLIC RESINS

MOLDING COMPOUNDS

INDUSTRIAL RESINS

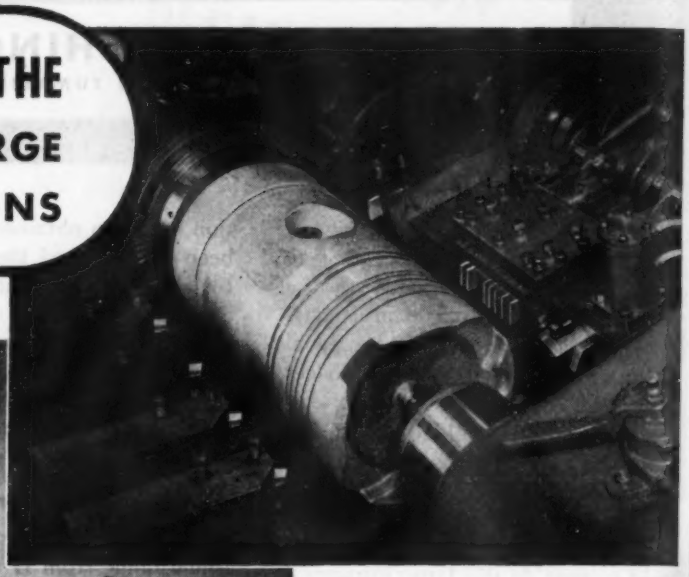
OIL SOLUBLE RESINS

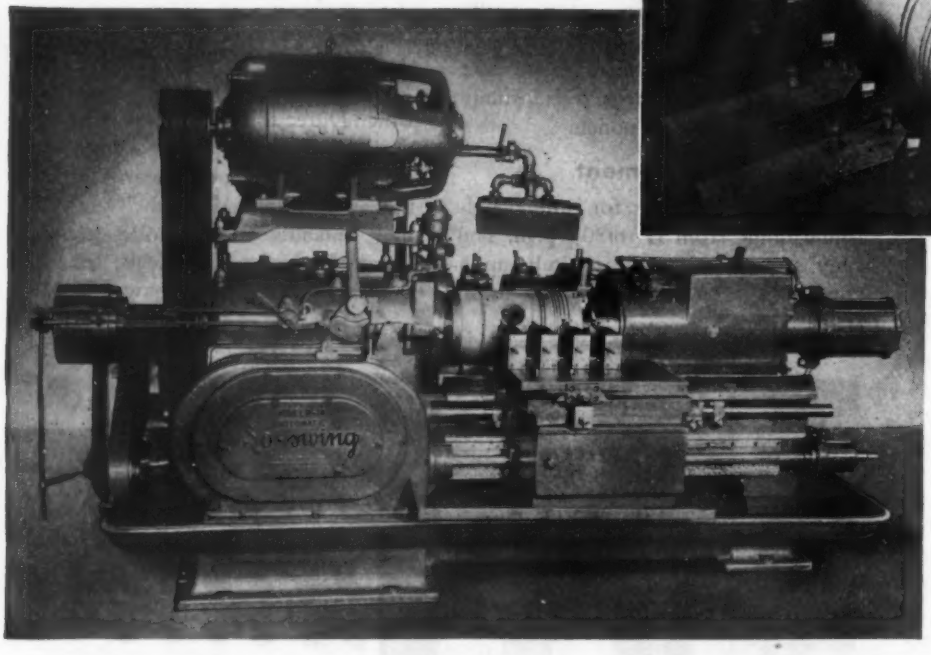
PLASTICS THAT FIT THE JOB

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

Lo-swing MODEL R-14 LATHE EQUIPPED FOR TURNING LARGE SIZE DIESEL MOTOR PISTONS





Above: Close-up view showing tooling.

At left: Front view of machine with belt cover removed to show V-belt drive.

Problem: To automatically turn, groove and face special alloy pistons having a maximum diameter of 10.5".

Solution: The model R-14 Lo-swing was selected for this job due to its rigidity and "Simplified Change-over Mechanism" which permits changing over from one size piston to another in a few minutes by simply making a few adjustments in gear segments which control cross slide movements.

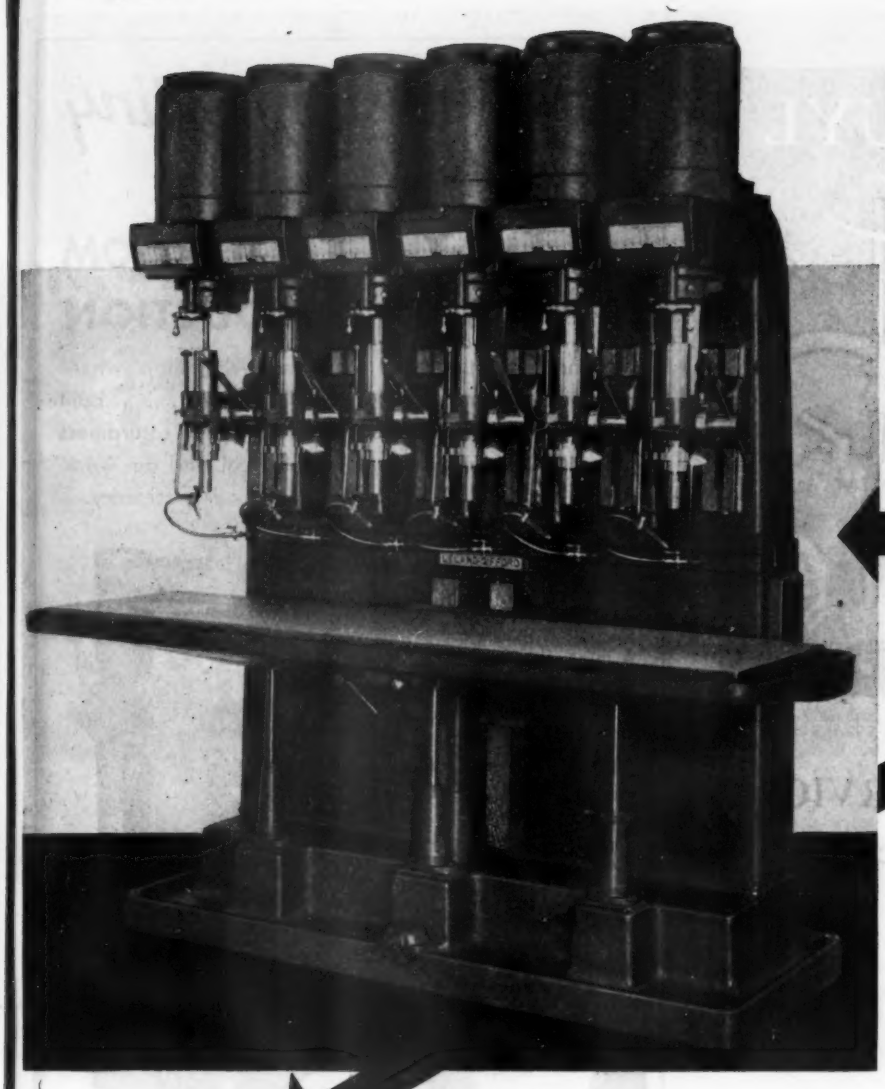
The work is centered on the driven end with an adapter plate machined to fit the bore of the open end of the piston which has been previously machined. This adapter is fitted with a hardened steel driving plate which contacts a lug cast on the inside piston wall, assuring a positive drive. The piston is supported on the tailstock end with a standard 60° revolving type center.

The turning operation consists of machining the outside diameters with four tools mounted on a single cross slide 17" wide. The grooving and facing tools are clamped on two independently operated Back Squaring Attachments, the movements of which are synchronized with the front slide.

The end facing tool is mounted in a special relieving type tool block (see close-up view) which automatically relieves the tool on the return stroke, preventing any scoring or marking of the finished face. The relief mechanism is controlled with a small cam mounted on back attachment cam shaft and may be set to obtain tool relief at any time during the operating cycle.

Sintered carbide tools are used on this job and a high grade finish is obtained on the ring grooves.

LATHE NEWS from SENECA FALLS



LELAND GIFFORD

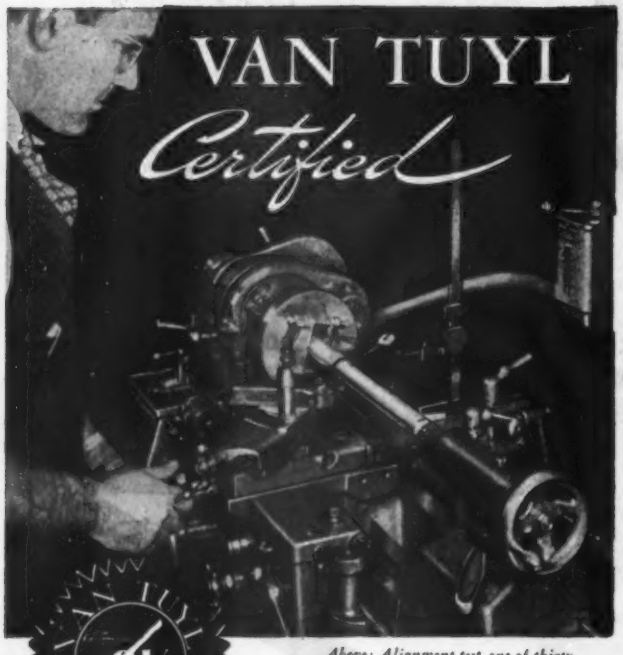
NO. 2 LMS MOTOR SPINDLE DRILLING MACHINES

Have

1. *Totally enclosed, Fan Cooled, Ball Bearing Motors.*
2. *Four or eight Spindle Speeds — Instantly Available.*
3. *Built-in Work Lights.*
4. *Preloaded Ball Bearing Spindles.*
5. *Ratchet type Feed Levers.*
6. *Box type, surface plate ribbed Tables.*
7. *Lots of Rigidity.*

LELAND GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.



Above: Alignment test, one of thirty detailed machine condition checks.

A NEW SERVICE for buyers of Machinery and Industrial Equipment

TO SAFEGUARD the interests of the purchaser of machinery and industrial equipment Van Tuyl Engineering Corporation offers an independent inspection service. Every detail is checked to assure the client that:

—specifications are met precisely;
—valuation is as stated by seller;
—equipment is mechanically complete or deviation noted.

And . . .

—if equipment meets the rigid Van Tuyl Engineering standards, it is so Certified.

In addition, Van Tuyl Engineering will, if desired, estimate the cost of reconditioning; see that packing meets foreign importers' requirements; estimate cost and supervise installation at destination, advise as to type of equipment best suited for contemplated production; and furnish comprehensive plant and initial production engineering.

With a large staff of engineers, specialists in every branch of engineering for industry, Van Tuyl Engineering Corporation maintains offices in Detroit, Los Angeles, Mexico City, and has field engineers in every major industrial center in the United States. Participation in the high production records of leading American aircraft, armament and automotive manufacturers notably qualifies this organization to serve the best interests of buyers of both used and new machinery and other industrial equipment. Inquiries by responsible firms are invited and will be answered in full.

Buy with Confidence on Van Tuyl Certification

VAN TUYL ENGINEERING CORPORATION

LOS ANGELES • DETROIT • MEXICO, D. F.
Address: 8536 Sunset Boulevard • Los Angeles 46, California
CABLES VANTUYL LOS ANGELES

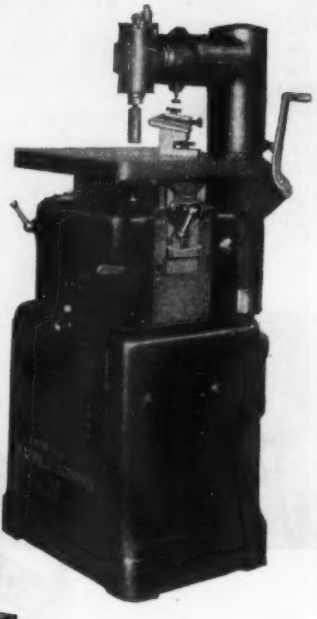
Precision Grinding

IN THE TOOL ROOM ....IN PRODUCTION

Designed for the tool room and die shop where precision workmanship is all important . . . built with Boyar-Schultz quality, resulting in sturdiness that HOLDS accuracy, not only in tool and die work, but in production wherever accuracy is necessary.

No. 2
PROFILE GRINDER

A large, floor model Profile Grinder with two independently powered spindles operating at 10,000 R. P. M. with vertical oscillations. Available also with single (lower) spindle only.



No. 618
SURFACE GRINDER

A sturdy, easy operating Surface Grinder, designed for the tool room and built to give positive precision performance over long periods of time.

No. 1
PROFILE GRINDER

A bench size Profile Grinder, a time saver in grinding dies, punches, cams and templates. It is a rapid stock remover and operates at 20,000 R. P. M.

WRITE FOR NEW CIRCULARS DESCRIBING THEM

BOYAR-SCHULTZ CORP.
2109 Walnut Street CHICAGO 12, ILL.

Your Product May Change after V-Day

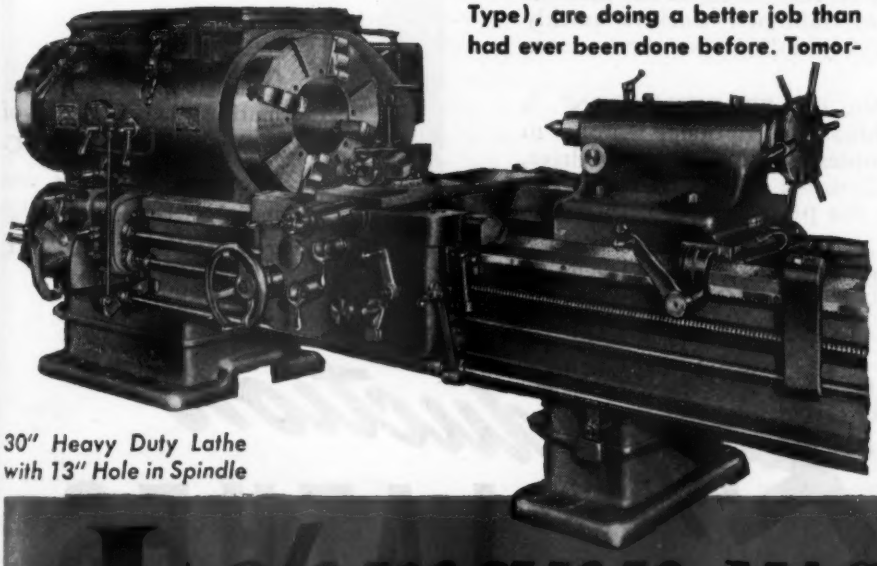
BUT-

HYDRATROL LATHES

(LARGE HOLLOW SPINDLE TYPE)

Will Continue to Increase Production-Lower Costs!

Today, in hundreds of war plants, under all sorts of conditions, HYDRATROL LATHES (Large Hollow Spindle Type), are doing a better job than had ever been done before. Tomorrow, on the peacetime production line, HYDRATROL LATHES will continue to increase production—improve work, cut costs. Let us show you how HYDRATROL LATHES can solve your present machining problems and at the same time prepare your plant for efficient, profitable peacetime production.



30" Heavy Duty Lathe with 13" Hole in Spindle

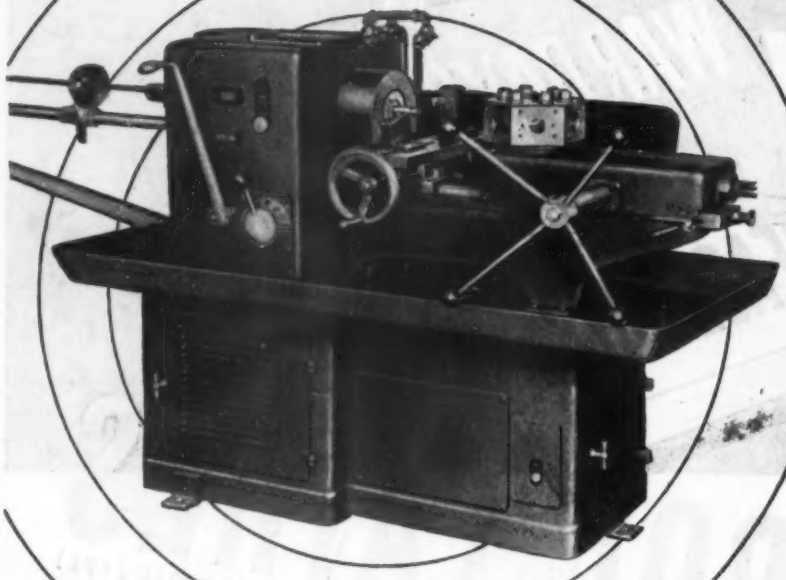
FIVE SIZES—18" TO 36"

Small . . . . 18" up to 7 1/4" Hole
Medium . . . . 24" up to 12" Hole
Large . . . . . 27" up to 13" Hole
Large . . . . . 30" up to 14" Hole
Large . . . 36" up to 16 1/2" Hole
(Standard type lathes, 16" to 36")

Lehmann MACHINE CO.

CHOUTEAU AT GRAND ★ ST. LOUIS 3, MISSOURI

ADDED FEATURES



EXPAND ITS USES

New developments have expanded the scope of uses for the Oster No. 601 "RAPIDUCTION" lathe.

Throughout the war, this *SIMPLIFIED* machine has made it possible for many companies to train new workers quickly to high standards and release highly skilled operators to more complicated machines.

Although low in price, the No. 601 "RAPIDUCTION" is actually a "custom-built" machine with optional features to meet specific requirements. Examples are the two types of drive, either WORM drive or DIRECT drive; and the automatically indexed, six-station turret or the plain saddle with single tool post.

Now, with the additional developments outlined briefly at the right, the Oster No. 601 "RAPIDUCTION" offers greater values than ever.

1 New 4-speed motor permits four speed changes without change of sheaves. (2-speed motor optional.)

2 Motor is mounted on oil-resistant rubber to insure smooth, quiet operation.

3 Individual ⅛ H.P. motor now operates coolant pump to provide uniform flow of lubricant, independent of spindle speeds.

4 New electrical controls have speed selector switch located conveniently for the operator.

5 Increased rigidity of the machine is insured with longer base of heavier construction.

MEMORANDUM

Automatic Chuck Capacity of the Oster No. 601 "RAPIDUCTION" lathe remains unchanged: 1½" round bar; 1⅛" square bar; 1⅜" hex bar.

Inquiries are invited but deliveries are uncertain due to conditions beyond our control.

OSTER "Rapiduction" LATHES

THE OSTER MANUFACTURING COMPANY • 2049 EAST 61ST STREET, CLEVELAND 3, OHIO, U. S. A.

SAVE TIME WITH THE GREENLEE "6"

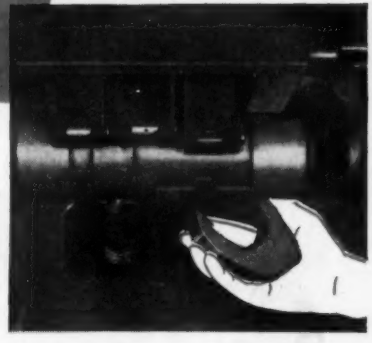
AUTOMATIC SCREW MACHINE

QUICK-CHANGE CROSS-SLIDE CAMS CUT TOOLING EXPENSE AND SHORTEN SET-UP TIME

NO SPECIAL CAMMING. On the GREENLEE "6" it is not necessary to make up or order special cams for the cross-slide feed. Inexpensive, standardized Greenlee cams are made in a range of ratios to meet all requirements and are interchangeable for all cross-slides.

EASY TO FIGURE. A quick computation by ordinary arithmetic from the known cuts required, and a reference to a simple table, provide fast selection of desired feed rates and standard cams required for necessary in-feeds. Greenlee cams are specified by a ratio, such as 2:1, 5:1, etc., indicating the ratio of tool slide feed travel to cross-slide feed travel.

QUICK CHANGE. To change a Greenlee cross-slide feed cam, you simply knock out a taper pin, slide back the key-carrying collar, pull off the old cam and put the new one in place, slide the collar over, and tap the pin home. In a matter of minutes, all six cams can be changed. The cam shaft is easy to get at, as shown in the pictures above.



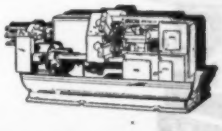
This close-up shows two cross-slide feed cams in place and the third one about to be slipped onto the cam shaft, where it will be secured by the key-carrying collar.

MANY OTHER FEATURES. These features of quick change, easy figuring, and standardized cams provide worthwhile savings in machine tooling equipment and set-up time on the GREENLEE "6". In addition, there are many other practical features, because of which this machine has often been called "the Operator's Favorite."

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO.
1727 MASON AVE., ROCKFORD, ILLINOIS



WRITE TODAY FOR MORE FACTS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

The SHELDON MACHINE CO. Inc.

Builders of Good Lathes Since 1919

ANNOUNCES THE ACQUISITION

OF

THE VERNON LINE

OF MACHINE TOOLS

•

VERNON HORIZONTAL MILLING MACHINES

VERNON VERTICAL MILLING MACHINES

VERNON TWELVE-INCH BACK GEARED SHAPER

•

THESE QUALITY MACHINE TOOLS
ARE NOW BUILT IN THE
SHELDON PLANT AT CHICAGO
AND SOLD BY SHELDON DEALERS AS

SHELDON
Vernon

QUALITY MACHINE TOOLS

Descriptive circulars will be sent if requested of the Sheldon Machine Co., Inc. 4258 N. Knox Ave., Chicago 41 Ill.

THERE'S NO TOOL (that slows you up) LIKE AN OLD TOOL!

Sure, tools function with satisfaction for a long, long time.

But if your competition installs new equipment that does the same job in far less time, and at far less cost, then tools that slow you down can close your doors.

Civilian goods production looms ahead. New processes, new materials, and new standards of precision, will make pressing demands on machine tool *design.* Stern competition will sound the call for better *performance.*

SELLERS, backed by 95 years of know-how, is busy today . . . working hand-in-hand with executives who are getting started now to meet the exacting demands of the post-war competitive era. We'll be glad to offer you this same full measure of cooperation.

WILLIAM SELLERS & COMPANY
1610 Hamilton Street, Philadelphia, U.S.A.

SELLERS PRECISION TOOLS SINCE 1848

TIME-SAVER ON ALL TYPES OF SLOTTING

4504

The 36" stroke Hy-Draulic Slotter speeds up production of big heavy slotting jobs. Powerful and rugged, it is fast, easy to operate, efficient. The early installation shown at upper right saved some 40% on machining crown brass fits. Later machines make similar savings on a wide variety of work.

Some of the Hy-Draulic Slotter features that provide these operating advantages are: power rapid traverse in all directions; start, stop and jog buttons on handy pendant; centralized controls, built-in dividing head, tilting ram. These, and the basic advantages of hydraulic feeds, are described in a bulletin that will be sent to interested executives on request. Please ask for Bulletin 1124.

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

5

FIRSTS BY PLAN-O-MILL

- First to install General Electric's remarkable new Thy-mo-trol electronic feed control!
- First planetary to mill external threads with standard multiple thread cutter!
- First planetary to coordinate feeds and speeds!
- First to provide absolute control of feed-in!
- First to offer a practical, low cost carbide thread milling cutter!

Attractive deliveries can be made on Planco High-Speed Steel Thread and Form Milling Cutters.

Now, to the proven speed and accuracy of thread milling, Plan-O-Mill brings you the proven *extra* advantage of cemented carbide. This tough, wear resistant material, forming the cutting edges of Planco Carbide Thread Milling Cutters, gives you greater accuracy, greater speed, and many more parts per grind. No tooling change is necessary.

Planco Carbide Thread Milling Cutters are available in National, Whitworth, Acme, V, and special forms, with or without provision for the Higbee cut. Both shank and shell type cutters are offered.

For increased production with maximum savings in time, money, and manpower — tool up today with Planco Carbide Thread Milling Cutters!

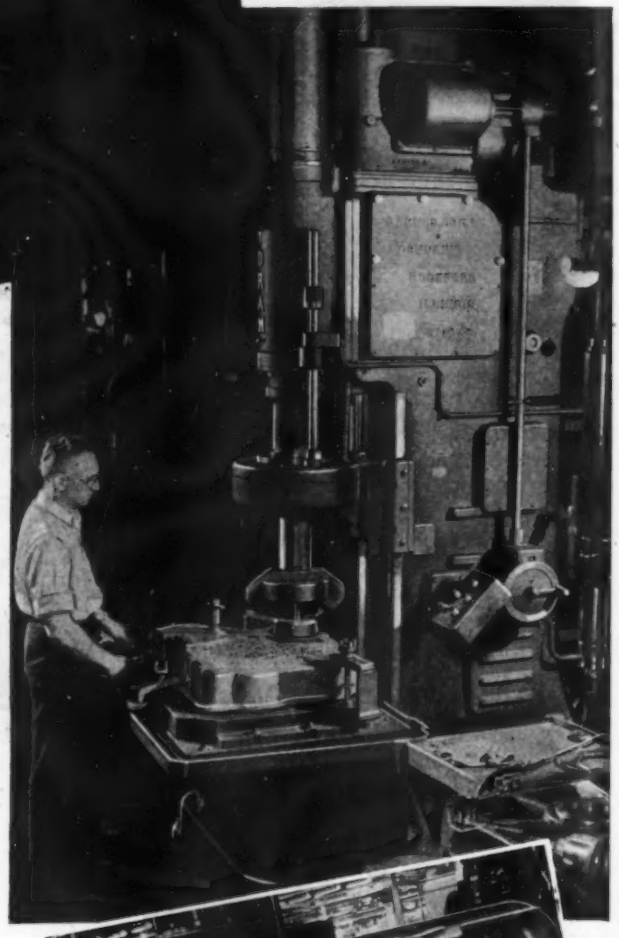
PLAN-O-MILL CORPORATION
1511 E. EIGHT MILE ROAD
HAZEL PARK, MICH.

THREAD AND FORM PLAN-O-MILL MILLING MACHINES

THREAD AND FORM PLAN-CO MILLING CUTTERS

250% Increase

Close-up view of BARNESDRIL *H-3 Hydram being used for rough and finish milling of Engine Support Bearing. Note that mill is equipped with two cutting tools, one roughing and one finishing.*



Floor-to-Floor Time Stepped Up from 3 to 10½ Pieces per Hour

• In the plant of a prominent mid-western manufacturer of Diesel Engines, BARNESDRIL H-3 Hydram Drilling Machines are employed for rough and finish milling of the engine support bearing of large, unwieldy gear case covers. Although this is essentially a turning job, the power and versatility of the BARNESDRIL Hydrams are used to excellent advantage in increasing production 250%... from 3 to 10½ pieces per hour.

With the former method, two separate operations, one for roughing and one for finishing, were necessary and machining and handling time were appreciably greater. Despite the heavy stock removal of ⅜", the part is now completed on the BARNESDRIL Hydram with one pass of the machine. This is made possible by the use of two cutting tools, for roughing and finishing, one on either side of the milling head. The location of the ram and hydraulic cylinder, directly over the working tool, affords the rigidity and power necessary for the heavy cut taken.

This is but one of the numerous instances in which BARNESDRIL Hydrams are being profitably applied to difficult machining operations. The Hydram's rigidity and strength, coupled with extreme versatility, enables manufacturers to adapt it to a wide range of drilling, reaming, boring and facing work. BARNESDRIL Self-Oiling Hydraulic Hydram Machines are available in three sizes with capacities from 2" to 4" in solid steel.

Call on a BARNESDRIL engineer today and learn how you, too, can profitably adapt a Hydram to your difficult machining operations. There is no obligation.

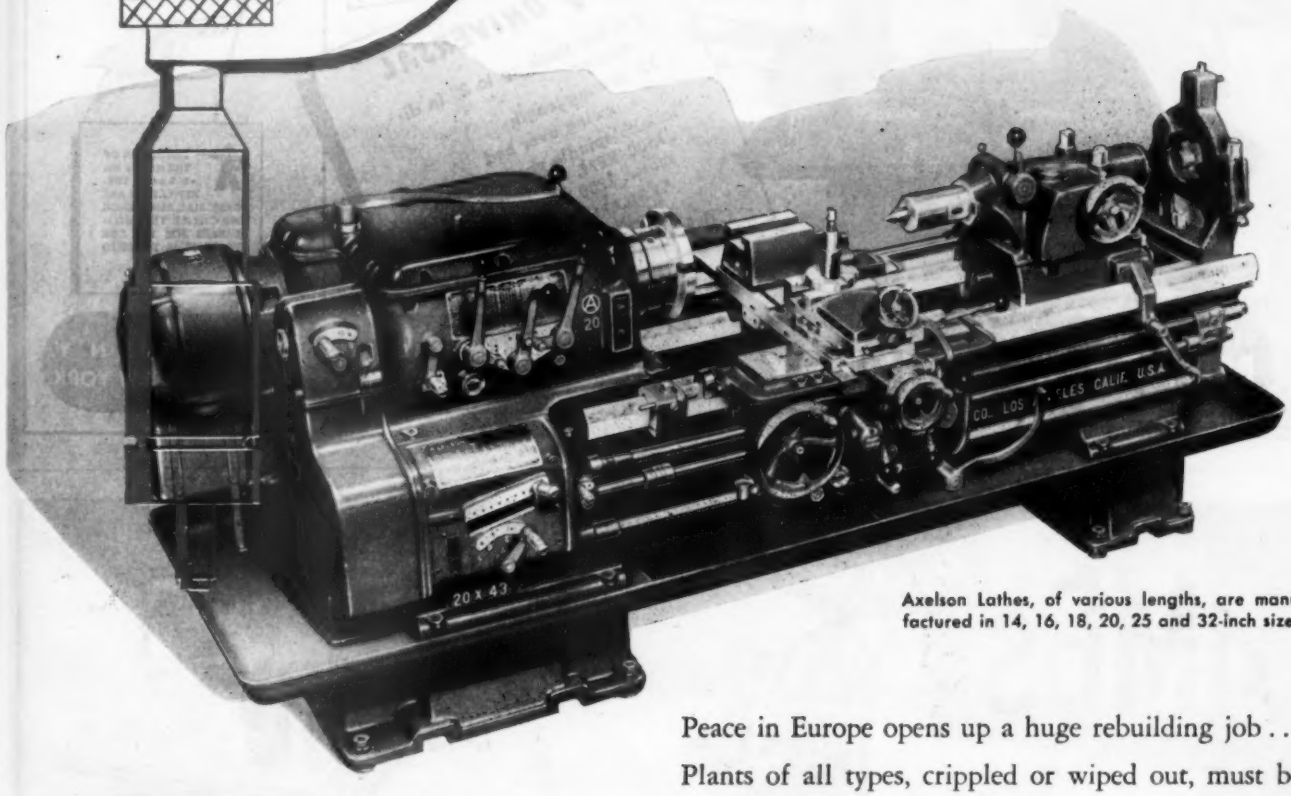
JOB DATA

Machine	BARNESDRIL H-3 Hydram
Operation	Rough and Finish Milling
Part	Engine Support Bearing
Material	Close Grained Cast Iron
Stock Removal	⅜"
Floor-to-Floor Time	10½ pieces per hour
Former Time	3 pieces per hour

Barnes Drill Co.

830 CHESTNUT STREET
ROCKFORD
ILLINOIS, U. S. A.

Precision for Peace



Axelson Lathes, of various lengths, are manufactured in 14, 16, 18, 20, 25 and 32-inch sizes.

AXELSON MANUFACTURING COMPANY
6160 S. Boyle Ave., (Box 98, Vernon Station), Los Angeles 11, Calif. • 50 Church St., New York City 7 • 3844 Walsh St., St. Louis 16, Mo.

ARMY-NAVY "E"

BUY WAR BONDS

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON LATHES

Dependable for over a Quarter Century

Peace in Europe opens up a huge rebuilding job . . . Plants of all types, crippled or wiped out, must be repaired or replaced . . . American machine tools are needed to do much of this huge task . . . When Japan falls too, the work will expand again.

Only the best available machinery can justify itself in the worldwide competition of the reconstruction era . . . High on the list of this work is metal turning, calling for long-lived, fast versatile *lathes.*

The best of lathes will meet severest tests on the reconstruction front . . . For this or any other challenge, in metal turning, the *Axelson heavy duty Lathe* will handle the most exacting and the heaviest turning with minimum loss of materials and time and maximum of profit.

MOREY TURRET LATHES

for BAR or CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL

For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

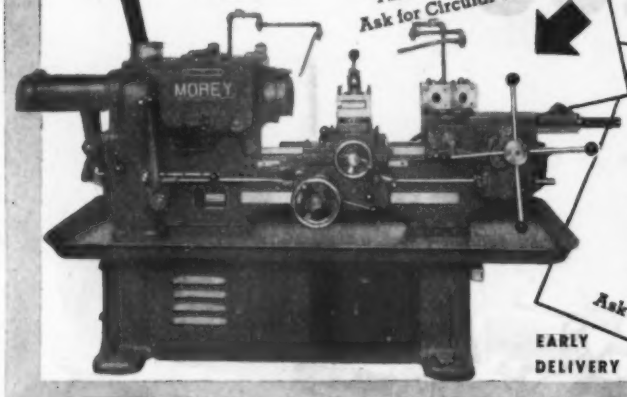
2 PLAIN-GEARED

For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

4 UNIVERSAL

For bar stock up to 2" in diameter
12" turning length
19½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM, constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 736A

EARLY DELIVERY



- INFINITE SPINDLE SPEEDS —Electrically Selected—
- DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR MARKS (patents applied for).
- GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.
- SPINDLE MOUNTED ON TIMKEN BEARINGS.
- RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS MODERN TOOLS WILL WITHSTAND.
- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

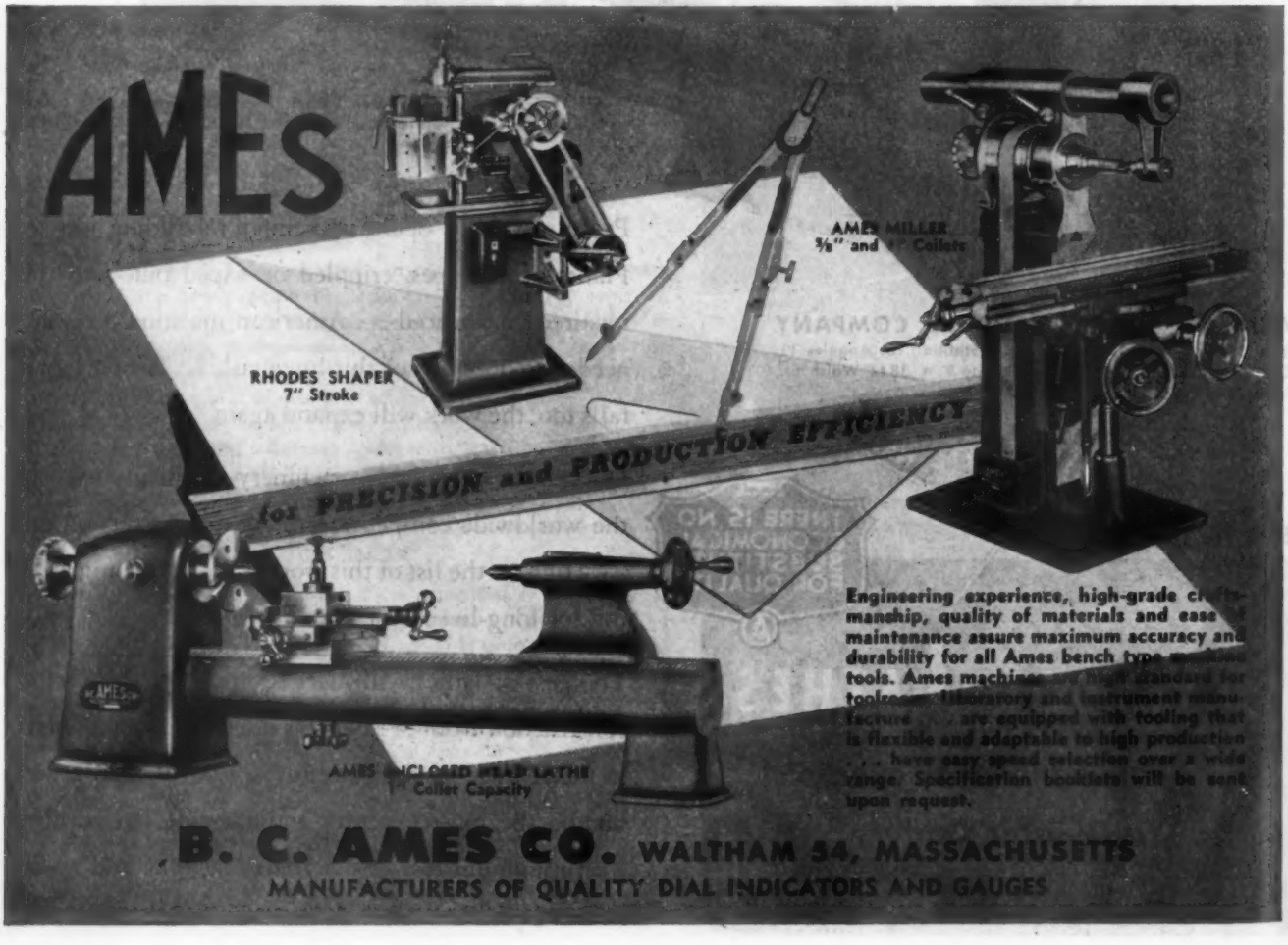
ARMY E NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

AMEs

for PRECISION and PRODUCTION EFFICIENCY

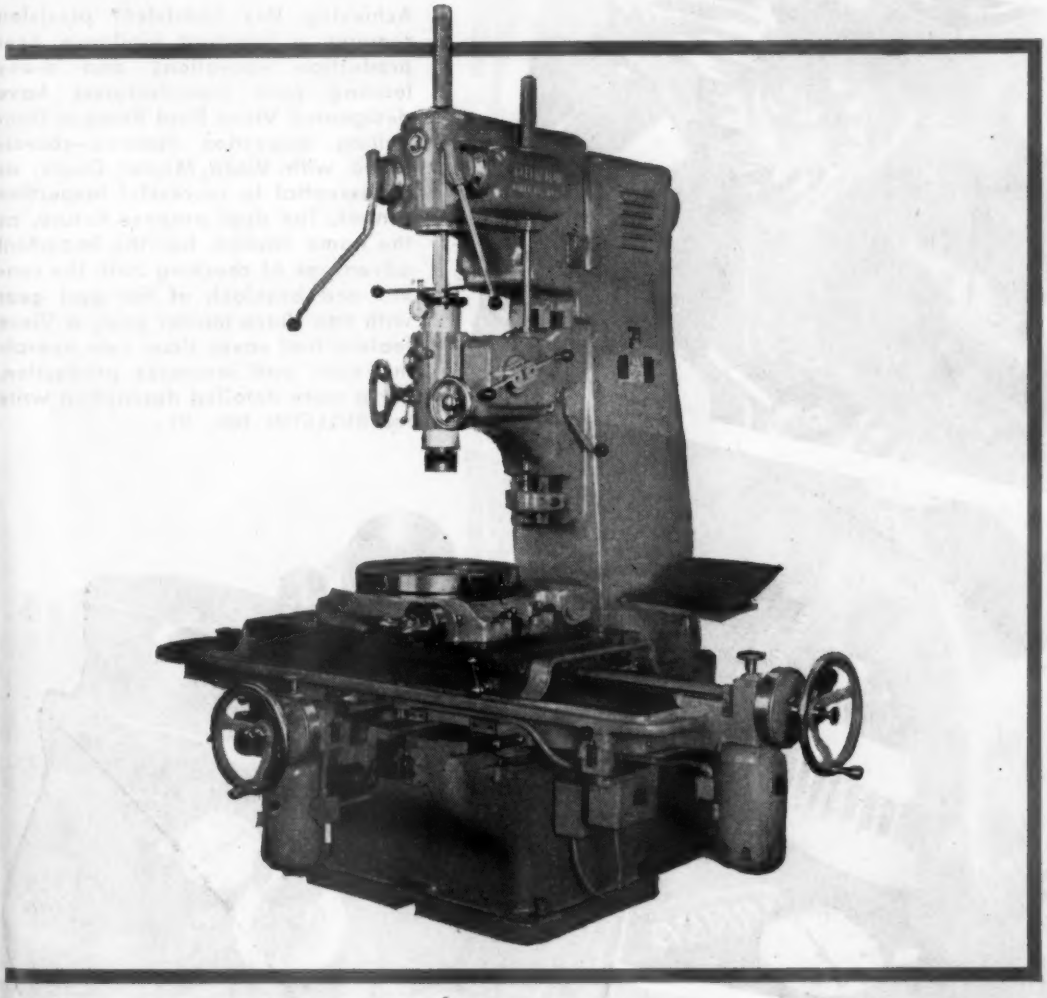


Engineering experience, high-grade craftsmanship, quality of materials and ease of maintenance assure maximum accuracy and durability for all Ames bench type machine tools. Ames machines set high standards for toolroom, laboratory and instrument manufacture . . . are equipped with tooling that is flexible and adaptable to high production . . . have easy speed selection over a wide range. Specification booklets will be sent upon request.

B. C. AMES CO. WALTHAM 54, MASSACHUSETTS
MANUFACTURERS OF QUALITY DIAL INDICATORS AND GAUGES

Cleereman JIG BORERS
ELIMINATE COSTLY LAYOUT TIME

No other machine or method can surpass the speed and accuracy of the Cleereman Jig Borer for locating and boring holes in jigs, fixtures, dies and gauges. Not only is the Cleereman Jig Borer unsurpassed in the tool room but it is efficient in performing small lot production work without previous layout, jigs, fixtures, or special tooling.



Cleereman Machine Tool Co. also builds Box and Round Column Sliding Head Drilling Machines. Write for catalogs today!

Address

BRYANT
Machinery & Engineering Company

General Offices
400 West Madison Street
Chicago 6, Illinois

Associated with
CLEEREMAN MACHINE TOOL CO.

TO THE *GEAR USERS* OF AMERICA

Little enough credit has been given the GEAR MAKERS of America for their outstanding contribution to the Gear Industry. Without the consistent, refined accuracy in todays gear construction, "pin-point bombing", "maneuverability", "rapid acceleration", and other overworked trade expressions would still be words instead of actualities.

Achieving this consistent precision requires a constant vigilance over production operations and many leading gear manufacturers have designated Vinco Dual Purpose Gear Rolling Inspection Fixtures—coordinated with Vinco Master Gears, as an essential to successful inspection control. The dual purpose fixture, as the name implies, has the important advantage of checking both the run-out and backlash of the part gear with one Vinco master gear; a Vinco feature that saves time, cuts operating costs and increases production. For a more detailed description write for BULLETIN NO. 91.

MILLIONTHS OF AN INCH FOR SALE BY VINCO

REG. U.S. PAT. OFF.

VINCO CORPORATION, 8851 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN; SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Cages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.

GORTON

SPECIALISTS FOR OVER 50 YEARS IN

Tracer-Controlled MILLING

How Tracer-Control SAVED 180 HOURS ON THIS PLASTIC MOLD WAR JOB

(Above) The taper, which could not successfully be generated by any other production method. Finished molded cone shown ¼ size.

ONLY THE GORTON DUPLICATOR could solve this Massachusetts manufacturer's problem on the production of molds for tapered cones. Other production methods caused an unevenness of the cut which could not be polished out.

The Gorton Duplicator was equipped with a power-driven rotary table. A simple template, held in a vise, was used as a master. TRACER CONTROL—the tracer moving along this template—guided the special cutter having a taper identical to that of the cone.

The floor-to-floor time for roughing by previous methods was 11 hours. The Gorton Duplicator cut this time to 2 hours—a saving of 180 hours on the roughing of 20 molds—and produced an extremely fine finish. Both roughing and finishing operations were done on the Gorton Duplicator.

PRODUCTION DATA

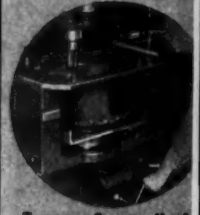
Material—Tool Steel.
Operation—Duplicating Molds.
Feed—Manual.
Speed—Roughing 750 r.p.m.
Finishing 3600 r.p.m.
Time, Floor-to-Floor—Roughing 2 hours—Finishing 1 hour.

Use Gorton Free Engineering Service

Gorton Engineers invite you to submit any problem to be solved. For more than 50 years, Gorton Engineers have constantly added to a wealth of machining information in our performance record files. These records often contain the solution to a problem similar to yours. Submit prints or specifications through your nearest Gorton dealer, or direct to the Gorton factory at Racine, Wisconsin. There is no obligation.

The *Right* Size The *Right* Type of Machine for Every Job . .
From 2 oz. to 2 ton

DIE BLOCKS



Tracer-Controlled MILLING

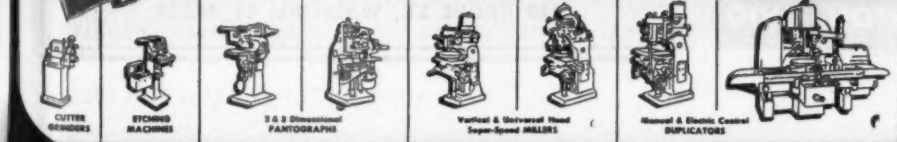
Tracer-Controlled DUPLICATING

Tracer-Controlled ENGRAVING

Tracer-Controlled ETCHING

GORTON ARMY-NAVY

GORTON *Precision* MACHINES


CUTTER GRINDERS
ETCHING MACHINES
3 & 3 Dimensional PANTOGRAPHS
Vertical & Universal Head Super-Speed MILLERS
Manual & Electric Control DUPLICATORS

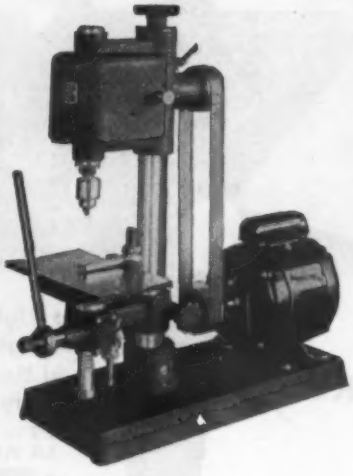
TEAR OFF COUPON AND MAIL TODAY

George Gorton Machine Co.,
1507 Racine St., Racine, Wis.
Send me these free books

- ☐ Condensed Catalog
- ☐ Die and Mold Duplicators

Name..... *Title*.....
Company.....
Address.....
City..... *State*.....

HAMILTON TOOLS BUILT FOR PRECISION WORK



HAMILTON SENSITIVE TAPPER

Like all other Hamilton Tools this tapper is precision-built for precision work. Ideal for instruments, cameras, watches, clocks and all other light work. Easy to operate . . . attach to any light socket.

HAMILTON "VARIMATIC"

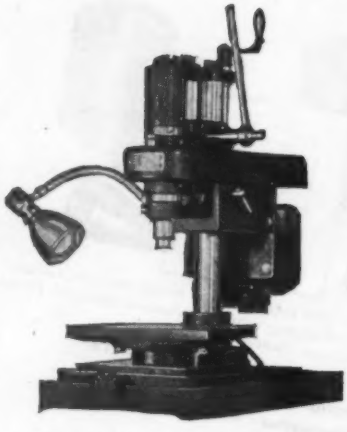
Instantaneous variable speed adjustment in two ranges.

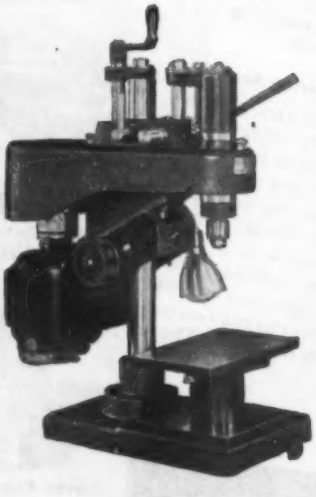
Low range 840 to 2700 r.p.m.

High range 2900 to 9300 r.p.m.

Drill capacity, .004" to 5/16".

Full floating spindle especially designed to eliminate belt pull on the spindle.





HAMILTON MAXI-JR-E

For drilling small holes from .004" to .250" diameter. Self contained drilling unit swings radially on the column and can be locked in any desired position. Can be ganged for sequence operations or to increase production. Possible spindle speeds from 750 to 8750 r.p.m.

Full floating spindle specially designed to eliminate radial belt pull on the spindle.

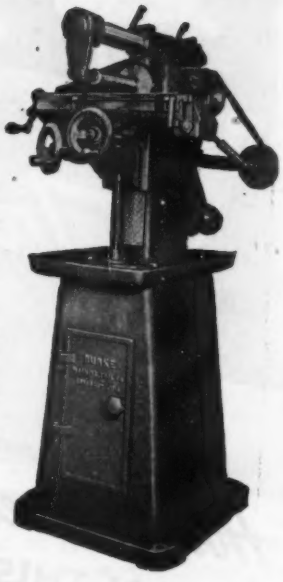
WRITE FOR BULLETINS ON HAMILTON TOOLS

The Hamilton Tool Co.

830 NINTH ST. HAMILTON, OHIO

BURKE MILLING MACHINES

. . . Put Your Small Work on a Production Basis!



Those small, difficult jobs can be handled on a *production basis* with BURKE Motor Driven Milling Machines Nos. 1, 2, 3, & 4. Primarily, this is because BURKES have been *specially designed and built* to do smaller milling jobs efficiently and economically.

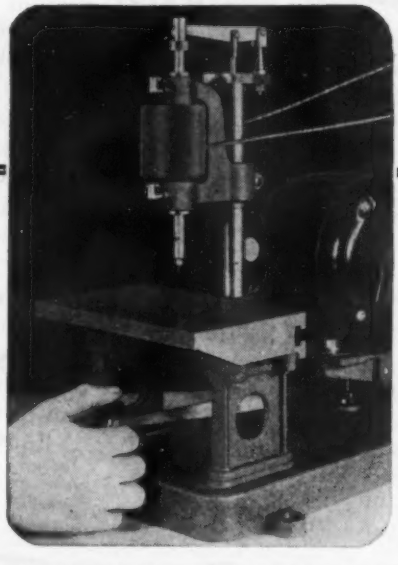
Then, too, a number of attachments are available . . . attachments that increase the units usability, and add to your productivity. These include a vertical milling attachment, index centers, and vises—3 types, including swivel base. Now, when production must be stepped up, is the time to investigate the profit possibilities of BURKE Milling Machines, as applied to your work.

Complete Information Will Be Sent You Upon Request — Write!

BURKE MACHINE TOOL CO.

CONNEAUT · · · OHIO

Speed—Accuracy—Facility for extremely small drills



THE LORD & DAVIS Super-Sensitive HIGH SPEED DRILL PRESS

The sensitivity of this precision machine—furnished in one, two, three or four spindles—is attained by balancing the spindle by means of the vertical component of the belt tension. Needle bearing construction of drilling head permits both axial and vertical motion of spindle, allowing spindle to float. The feel of the smallest drill is perfectly transmitted to operator's finger tip thus reducing drill breakage to a minimum even on heavy feeds.

Spindle speed 3000 to 23,000 R.P.M.—Drill capacity .004" to 1/16". Maximum feed—1¼". Table 4⅞" x 8".

Write for Illustrated Bulletin, giving complete details

MASSASOIT MACHINE CO.

220 GROVE ST., WALTHAM 54, MASS.

THIS *Universal Head* SIMPLIFIES COMPLICATED CUTTING OPERATIONS

PRICE
$374.50
INCLUDING 3 H.P. MOTOR
F.O.B. Plainfield
(Slightly higher west of Rockies and in Canada)

Walker-Turner METAL-CUTTING RADIAL MACHINE

The head on a Walker-Turner Metal-Cutting Radial Machine can be quickly set to cut at any angle. Cuts wide metal shapes. Will dado, trench, miter, *even operate with motor in vertical position.* Patented Walker-Turner Geared Motor is shock-proof, gets shaft closer to work, makes deep cuts with smaller blades than in conventional motors. Blade feeds through work with shorter cutting arc and less frictional heat. Operator gets clear view of work, no interference from overhanging arm. Write today for complete information.

WALKER-TURNER COMPANY, INC., Plainfield, New Jersey

walker-turner COMPANY, INC. PLAINFIELD, N.J. U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

In Tandem or Single

Cutting 4 pieces simultaneously with 4 PEERLESS 11" Hydra-Cut Metal Saws at Weirton Steel, Weirton, W. Virginia.

PEERLESS HYDRA-CUT

CUTS SAWING COSTS

SMOOTH, straight-line metal sawing at high speed with Peerless Hydra-Cut Saws is a practical, profitable way to better production. Check these operating figures — 33% greater cutting speed . . . 25% longer sustained cutting accuracy . . . 75% more coolant capacity . . . 33% greater rigidity—and you will quickly sum up the advantages of having Hydra-Cut Metal Saws in your shop.

All Hydra-Cut Models have finger tip adjustment of feed pressure and the famous Peerless Four-Sided Saw-Frame. Fully automatic and hydraulically controlled, Peerless Hydra-Cuts can saw 5 to 10 square inches per minute. Singly or in tandem, these precision metal Saws save time and money.

Get the complete story today from your local Peerless dealer or write direct to us for latest catalog.

Write Department AM-745

PEERLESS
MACHINE COMPANY
RACINE · WISCONSIN

FOR CONTINUOUS HIGH DUTY PRODUCTION

KAUFMAN #10A Hi-Duty single spindle. Lead Screw Tapper made in 3 HP and 1½ HP models, with ¾" N.C. and 1½" N.C. Threads in alloy steel offers these features:

Fully enclosed . . . lead screw and nut operate constantly in oil bath . . . positively wear-proof clutches instantly engaged and controlled by air cylinder . . . quick traverse when not actually cutting threads . . . accurate depth control . . . control to protect tap overload, and further protected against jamming if work is placed in upside down . . . class 3 fits always assured and perfectly controllable. Complete information upon request.

KAUFMAN MFG. CO.
MANITOWOC, WISCONSIN

ENGINEERED TO THE JOB ... PRECISION MADE FOR EXACTING PERFORMANCE AND

Mastercased TO GIVE UP TO 500% LONGER LIFE

MASTERFORM

HIGH-SPEED *Mastercased CUTTING TOOLS

Meet the Challenge

*Mastercasing...
That's our improved super-heat-treating process which adds to the life of Masterform cutting tools...will multiply your production...will divide your costs per cut.

Want proof? Write, wire or phone for name of nearest-to-you factory representative...or without the slightest obligation, send specifications for estimates and complete information.

MASTERFORM TOOL CO.
44 IRVING PARK ROAD • CHICAGO 18, ILL.
OUTSTANDING ENGINEERING SERVICE AND CRAFTSMANSHIP

STOP "FINGER-PRINT" SABOTAGE

with This New Special-Purpose Rust Preventive, Designed for Use Between Operations in Your Plants!

You can't stop necessary handling of highly polished pieces of work between operations in your plants, but—

You *can* stop the "finger-print" sabotage caused by corrosive perspiration acids and rust-producing moisture.

Here's the answer—a new rust preventive developed by Socony-Vacuum especially for this purpose.

The new product—S/V Sova-Kote 203—can be applied by either cold dip or spray. It literally wipes off any moisture that may have collected on the work piece, and then forms a thin, resistant film of oil on the surface of the metal.

This transparent film prevents further moisture from reaching the surface, neutralizes the effect of "finger-printing" during handling.

S/V Sova-Kote 203 can be easily removed with a simple kerosene dip. It's in production now, available for immediate delivery. Ask your Socony-Vacuum Representative for performance facts.

SOCONY-VACUUM OIL CO., INC.
Standard Oil of N. Y. Div. · White Star Div. · Lubrite Div. · Chicago Div. · White Eagle Div. · Wadhams Div. · Magnolia Petroleum Co. · General Petroleum Corporation of Calif.

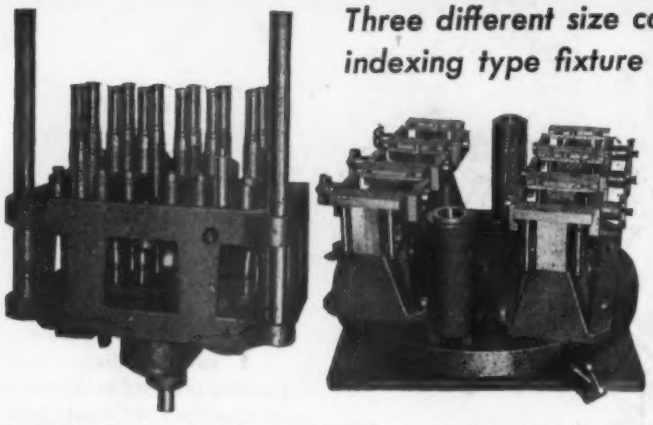
RUST IS WASTE—
SOVA-KOTE YOUR METAL

SOCONY-VACUUM'S 5 Steps to Lower Production Costs:

1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

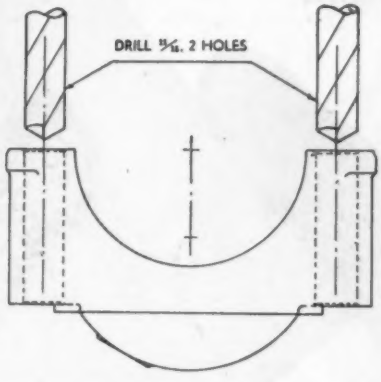
GARGOYLE Lubricants

12 Holes Drilled in SIX CONNECTING ROD CAPS in 69 seconds · · · ·



Three different size caps handled in two-station indexing type fixture

Alloy Grey Iron Casting. 11/16" drills; feed 50' per minute; .009" penetration per revolution at 278 r. p. m.; depth of cut 2⅞". This job is an example of what can be done in faster, lower cost production with Hoefer Multiple Spindle Heads. Your requirements can as easily be developed by our engineers. Write and tell us about your job.

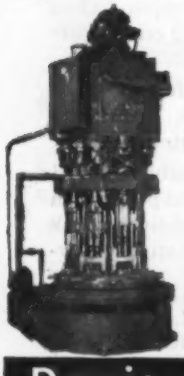


• Twelve-Spindle Head and Fixture. Head is of Universal Joint Adjustable Type, arranged for Locator Plate (not shown) for rapid setting of spindles to any required hole layout within range of head. Fixture is of two-station Indexing Type containing two sets of Work Holding Units, each set accommodating six Connecting Rod Caps (three different sizes). Six Caps are being drilled simultaneously while six Work Holding Units are being unloaded and loaded with new parts.

HOEFER'S WHOLE BUSINESS IS HOLES

Hoefer's Whole Business is Holes · · · ·

HOEFER MFG. CO. *Freeport, Ill.*



Vertical ROTO-MATICS

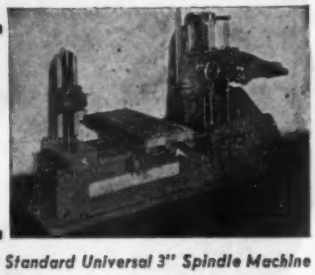
Multiple spindle drill heads and automatic clamping provide added production.

Continuous operation is essential for maximum production. VERTICAL ROTO-MATICS are continuous operating, multiple spindle, non-indexing machines that are adaptable to a wide range of machine problems. . . . *Bulletins 110 and 120* may help you solve your problems. Write for them.

Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
6411 W. Burnham St. Milwaukee 14, Wisconsin

UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

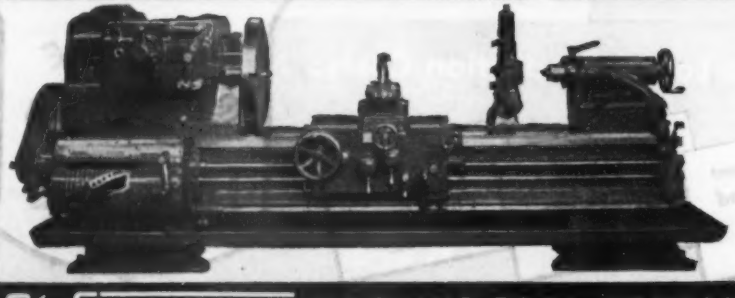
Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

SPRINGFIELD GEARED HEAD LATHES

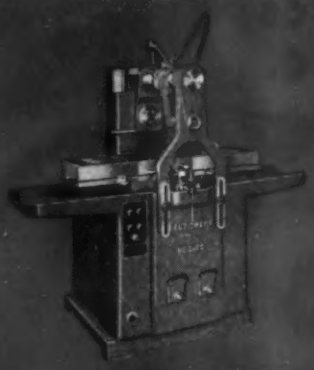


for peacetime or war production!

A lathe purchased now, for round-the-clock war production, must still meet peacetime requirements. Therefore, specify SPRINGFIELD lathes —flexible, efficient, ideal for emergency or normal production. SPRINGFIELD lathes are built in sizes from 14" to 30". Write for descriptive bulletins, prices, deliveries, etc.

The SPRINGFIELD MACHINE TOOL COMPANY · · · SPRINGFIELD, OHIO, U.S.A.

Rugged...

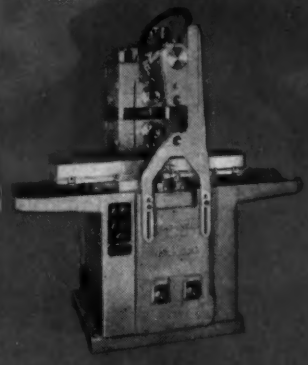


No. 2-20 . . . 20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.

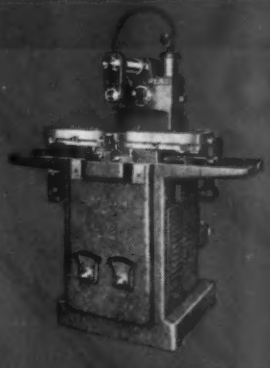
Simple...

No. 2-20V . . . 20" table travel . . . vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.

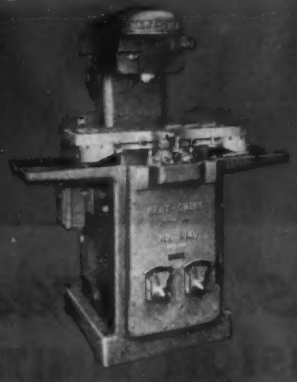
Efficient...



No. 2-20DS . . . Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.



No. 1-14 . . . 32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.



No. 1-14V . . . 14" table travel with full automatic cycle . . . vertical spindle with speed range 115 to 3000 R.P.M.

No. 1-M . . . Hand feed to table and head . . . 25" x 9" table . . . 1 H.P. . . . head counterbalance is adjustable.

Cost-cutting Dependability with

KENT-OWENS

Milling Machines

Write for Bulletins • KENT-OWENS MACHINE CO., TOLEDO, OHIO

No. 1-V . . . Hydraulic vertical head feed . . . 5¼" head travel . . . 25" x 9" table.

No. 1-B . . . 8" table travel . . . 25" x 9" table . . . full automatic hydraulic table feed.

KENT-OWENS REPRESENTATIVES

BOSTON — General Machinery Corp.
BUFFALO — Don W. Patterson
CHICAGO — Noll, Kohlbusch & Bissell
DALLAS — Hamilton-Hunter Mach'y Co.
DAYTON — Gosiger Mach'y Company
DETROIT — A. C. Robertson Mach'y Co.
GRAND RAPIDS — Joseph Munshin
HOUSTON — Oliver H. Van Horn Co., Inc.
INDIANAPOLIS — Ostis-Booth Machinery Co.
KANSAS CITY — Eichman Machinery Co.
LOS ANGELES — Bodes & Devine Mach'y Co.
MILWAUKEE — Noll, Kohlbusch & Bissell
MINNEAPOLIS — The Somerlon Company
MOLINE — John J. Normoyle Co.
MONTREAL — F. P. Barber Mach'y. Co.
NEW ORLEANS — Oliver H. Van Horn Co., Inc.
NEW YORK — Mornington-Wilson-Brown Company
PHILADELPHIA — Cairo Machinery Company
PITTSBURGH — Barney Machinery Company
ROCHESTER — F. W. Schiefer Machinery Co.
SAN FRANCISCO — C. P. Beloni Machinery Co.
ST LOUIS — Blackmer & Stewart Mach'y. Co.; Clarke Equipment Company
SYRACUSE — J. F. Owens Mach'y Company
TORONTO — F. P. Barber Mach'y Company
WALKERVILLE — F. P. Barber Mach'y Company

Producing Parts Such as These
TO CLOSEST PRECISION LIMITS

Thousands of the small parts produced at Jack and Heintz, Inc., leading manufacturers of aircraft starters and accessories, are made on these Wickman High Precision Automatics. The parts shown are made from Standard Stainless Steel Bar Type 303. After machining, little if any finishing or polishing of these parts is required.

Wickman machines turn pivot points and tapers of any angle, back shoulders, multiple diameters, and recesses in a single operating cycle—to very close limits, with extremely fine finish. Attachments provide for drilling, reaming, counterboring, threading, tapping, slotting, etc., simultaneously with the machine operations; so parts are complete without second operation.

The machines shown are No. 2 models of 1/2″ capacity. The No. 1 of similar design has a 5/32″ capacity. Full details on request.

Wickman No. 2 automatic in Jack & Heintz plant, equipped with three spindle attachment

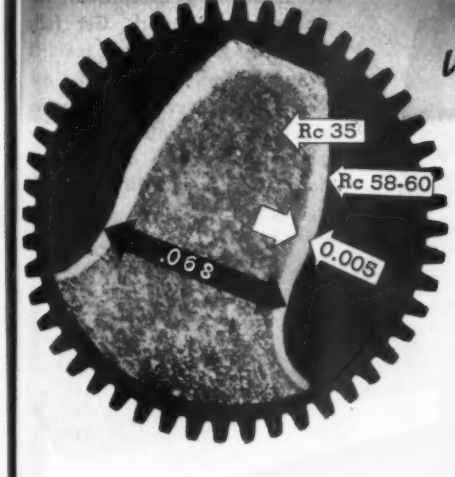
THE Wickman CORPORATION
1553 WOODROW WILSON AVE., DETROIT 3, MICH.
A. C. Wickman (Canada), Ltd., P. O. Box 9, Station N, Toronto, Ontario

Branch Offices: 1060 Broad St., Newark 2, N. J. • National City Bank Bldg., Cleveland 14, Ohio • Civic Opera Bldg., Chicago 6, Ill.

They're All Talking About It!

A New Thin Case Contour Hardening Job . . .

with MEGATHERM*



Thin case contour hardening of gear teeth with controlled depth of hardness has been made possible by the use of MEGATHERM induction heat.

The hardened surface completely follows the tooth and root contour of the gear with the core still in its original state, as shown plainly by this microphotograph. This 0.005 case was applied to gears of 24 D.P. —51 teeth—2.125 P.D.—2.208 O.D. and S.A.E. 4140 steel in 1/4 of 1 second with a 25 KW MEGATHERM—5 megacycle energy doing the job.

These long wearing contour hardened gears become an automatic production item with MEGATHERM.

Write *today* on your company letterhead for data on MEGATHERM.

Federal Telephone and Radio Corporation

REG. U.S. PAT. OFF.

AN IT&T ASSOCIATE

Newark 1, N. J.

This New Superior Shaper Costs 20% Less

The 20"

QUEEN CITY

Super Twenty Shaper

The 20" Queen City Super Twenty Shaper marks a great advance in shaper design and construction which enables us to sell this machine at a price 20% lower than any comparable make.

The following are just a few of the outstanding features of this remarkable new shaper: the ram is of the V-type of wide bearing; clutch is dry multiple-disc type; the feed range is extremely versatile—from .008" to .191", quickly and easily changed; a high torque motor for power rapid traverse is standard equipment; an electrical limit switch permits complete motor control; Timken bearings are used throughout.

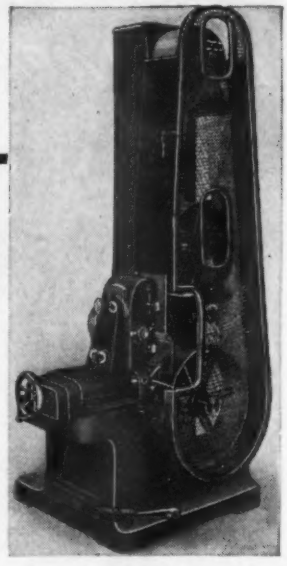
For superior performance, low initial cost and upkeep, the Super Twenty is an outstanding value.

AGENTS IN PRINCIPAL CITIES

QUEEN CITY MACHINE TOOL Co.
217 E. SECOND ST.
CINCINNATI 2, OHIO

WRITE FOR DETAILED LITERATURE

"PRODUCTION" *Type A* HIGH SPEED POLISHING MACHINE



Providing Automatic Feed and Assuring Superior Finish . . .

This machine . . . for polishing and finishing metals, fibre, wood, rubber, etc. . . . is a high speed, centerless feed unit. A power feed attachment makes it possible to feed cylinderical work in long or short lengths through the machine automatically. With Taper Feed Attachment, tapered cylindrical work can be handled continuously.

An outstanding feature of the Type "A" machine is the use of a two-belt system which provides for chip disposal immediately and which results in a finer finish of work. The capacity of this machine with power feed attachment, is ¼" to 6" diameter round stock.

Specifications

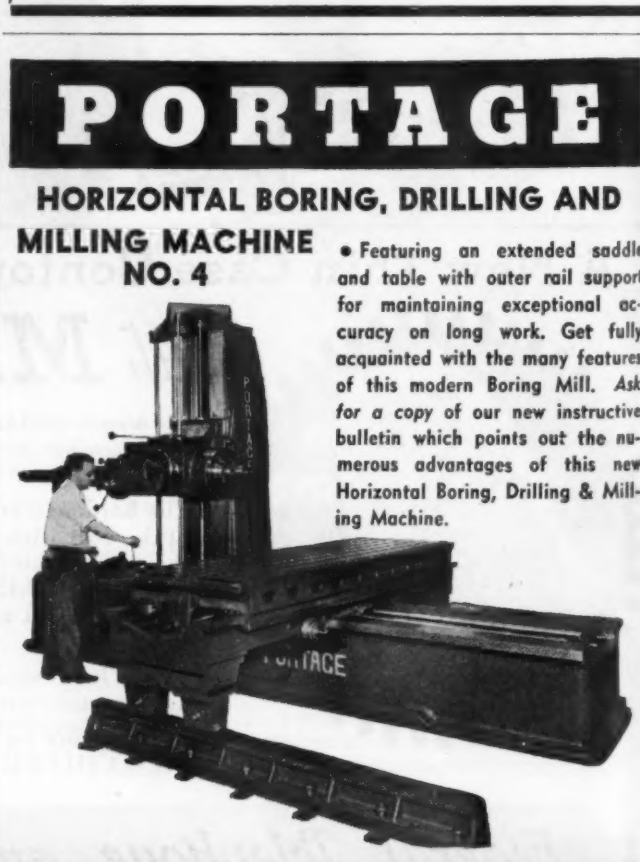
Speed Leather Cushion Belt—6300 Ft. per min.
Floor Space—40" x 50".
Height—89".
H.P.—10.

Write for illustrated literature describing this modern machine.

PRODUCTION MACHINE CO.
Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.
GREENFIELD, MASS., U. S. A.

PORTAGE

HORIZONTAL BORING, DRILLING AND MILLING MACHINE NO. 4



• Featuring an extended saddle and table with outer rail support for maintaining exceptional accuracy on long work. Get fully acquainted with the many features of this modern Boring Mill. *Ask for a copy* of our new instructive bulletin which points out the numerous advantages of this new Horizontal Boring, Drilling & Milling Machine.

THE PORTAGE MACHINE CO.
AKRON 11, OHIO

3

WHEELS • BLOCKS • STICKS • RODS

A COMPLETE LINE IN EACH TEXTURE

for

Close-Tolerance, Precision
Manual and Machine

BURRING • FINISHING • POLISHING

RESILIENT, RUBBER-CUSHIONED ABRASIVE TEXTURES

- **ELIMINATES GRIND-TO-BUFF PRODUCTION STEPS**
- **ASSURES OUTSTANDING PRODUCT-QUALITY**
- **FINISHES ALL METALS**

Get Catalogs and prices from your distributor; production short-cut suggestions from Brightboy service representatives.

Brightboy FINE-TEX
Smoother, finer texture for work on softer metals, producing special finishes and for applications where the coarser wheel might not be suitable.

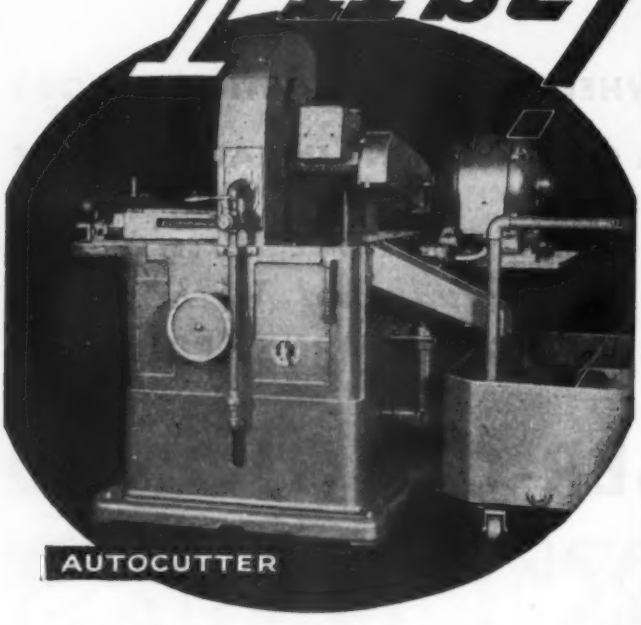
Brightboy TUFF-TEX
Tougher texture, for finishing hard metals. The tougher binder accents the abrasive action, yet retains the soft rubber cushion, finishing and polishing in one operation.

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
Newark 7, N. J.

Brightboy STANDARD
Brightboy STANDARD texture is a favorite for burring, finishing and polishing on the widest variety of metals and metal parts.

WELDON ROBERTS
Brightboy

IT'S A First



Yes, this **CAMPBELL "MODEL 700"** is the first *fully automatic* abrasive cutting machine ever built. Coming from **CAMPBELL**, manufacturers of the most complete range of abrasive cutters, that's big news.

This **"700"** is "first" another way. It is the opening announcement of **CAMPBELL'S** post-war program of development, based on wartime improvements all through the line. Other announcements will follow.

Maybe there's a way a **CAMPBELL ABRASIVE CUTTER** could speed up or economize your production. It's easy to find out.

WHY NOT DO THIS?

Write and tell us (1) the range of sizes, (2) kind of material, (3) length of cutoff pieces, (4) length of stock before cutting, (5) tolerance for length of cut pieces and (6) hourly production requirement. With this information, **CAMPBELL** engineers can recommend production procedure and work up cost sheets for you.

Campbell

ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION
BRIDGEPORT · CONNECTICUT
ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ACCO AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT · CONNECTICUT

The SUPER METHOD

of TRIMMING FORMED PARTS

and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind. Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.

Write for Your Free Copy

FRICTION SAWING *with* ***Tannewitz***

HIGH SPEED BAND SAWS

THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

KNIGHT VERSATILE MILLERS ACCURATE · RIGID

FOR FURTHER DETAILS SEE FULL PAGE AD IN PREVIOUS ISSUE

W. B. KNIGHT MACHINERY CO.
ST. LOUIS MISSOURI

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

MILLHOLLAND

Automatic DRILLING - BORING MILLING - TAPPING Units

½ to 20 HORSEPOWER DRIVE

AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY

W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

BAKER

Engineering is helping to put more Aircraft in the air faster!

Getting aircraft into the air—and keeping them there—involves many hundreds of individual engineering and manufacturing problems. Below is a BAKER Machine that supplied the answer to one of those problems . . . specifically, to handle rapidly and efficiently the drilling of seven water outlet holes in each side of aluminum aircraft engine cylinder heads.

Here's how BAKER Engineers tooled up the standard BAKER 3½x16 Two-way Horizontal unit for this job:

1. A compact seven spindle fixed center multiple head was installed, with a direct coupled drive from a motor mounted on the saddle.

2. Saddles were mounted on four nitralloy bars, and fitted with X-alloy hard steel bushings.

3. A special quick-acting fixture was furnished, enabling the operator to slide the cylinder head into the fixture at the front and out to the rear, thus reducing handling.

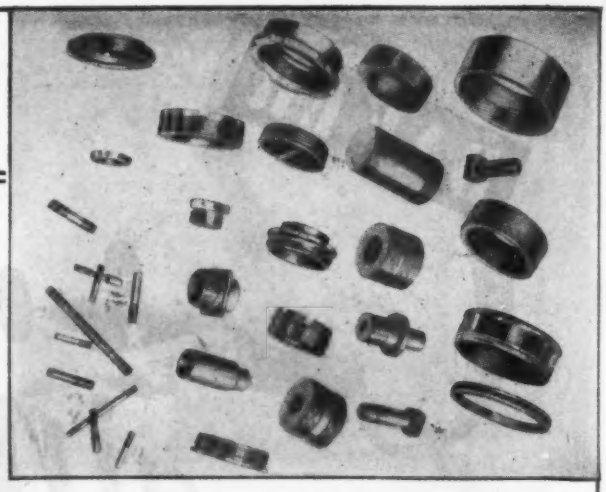
4. Cycle of operations was made completely automatic. Waste motion was further reduced with the result that the operator has only to load, push a button and unload.

Here again BAKER Engineering and a standard BAKER machine combine to produce a unit that might have been "built for the job". Send your special problems to BAKER for equally practical solution.

BAKER BROS., INC. TOLEDO 10, OHIO

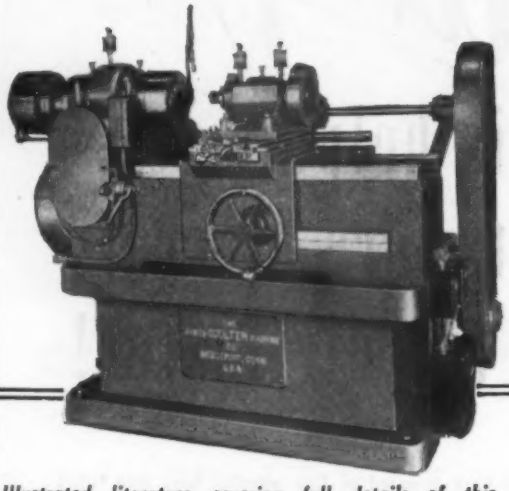
Single and Multiple Spindle Machines for Drilling, Boring and Tapping

. . . for Precision Internal or External Threads . . . Right or Left Hand



HANDLE PRODUCTION AUTOMATICALLY on the

COULTER HOB THREAD MILLER



This modern machine can be depended on to produce and duplicate close tolerance threaded parts. With the exception of loading, all operations are fully automatic. Any parts that can be held in a Universal chuck, air-operated chuck or special fixture can be threaded, on the COULTER, internally or externally, either right or left hand.

Work can be inserted from either face or rear end, through large hole in work spindle, thereby making possible the threading of shaft ends, tubing or other long work.

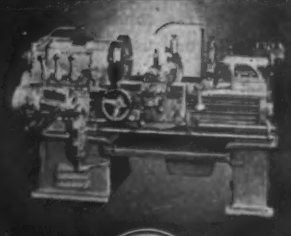
Individual Motors on the COULTER for work and cutter spindles provide a wide range of speeds and feeds for handling such materials as brass, aluminum or steel.

Illustrated literature covering full details of this machine is available promptly on request.

THE JAMES **COULTER** MACHINE CO.

BRIDGEPORT, CONNECTICUT

REED-PRENTICE



LATHES • JIG BORERS
DIE SINKERS
DIE CASTERS
VERTICAL MILLERS
INJECTION MOLDERS

REED-PRENTICE CORP.
MACHINE TOOLS
WORCESTER MASS. U.S.A.

LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND
OHIO, U. S. A.

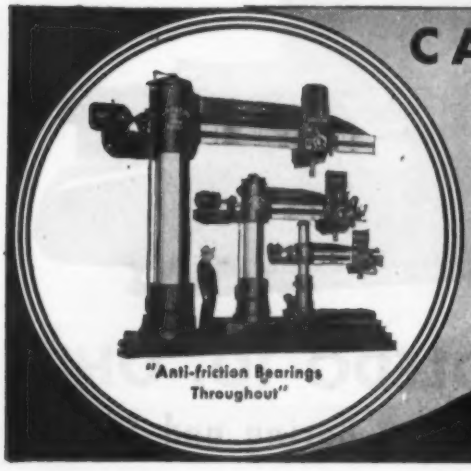
SMITH & MILLS

CRANK SHAPERS

sizes 12" to 32" stroke

THE SMITH & MILLS CO. **Cincinnati, Ohio**

CARLTON RADIAL DRILL



"Anti-friction Bearings Throughout"

FEATURES—1. Low Hung Drive to the Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all speeds. 4. Concentrated and Convenient controls. 5. Constructed on Unit Principal.

The **CARLTON**

MACHINE TOOL COMPANY

CINCINNATI, OHIO, U. S. A.

ARMY E NAVY

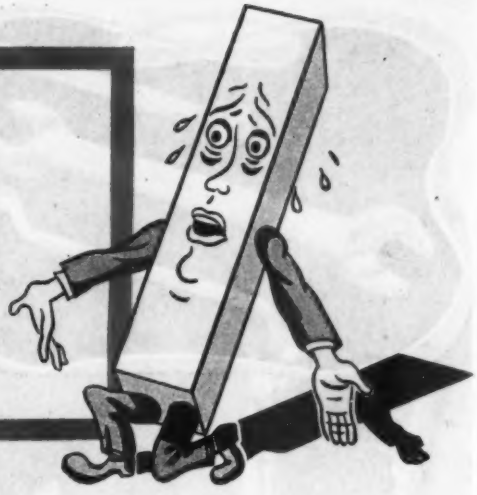
They're easier to reach with "SUPERRENCHES"

Awkward, hard-to-reach adjustments present no problem for these slim, taper-jawed "Superrenches". Forged from alloy steel, they are thin enough to operate half nuts yet their strength is equal to that of the strongest wrenches made.

Williams "Superrenches" are available in a wide range of patterns, with openings from 3/16" to 3-1/8". When wartime regulations are lifted they again will be furnished in bright chrome finish. Sold by Industrial Distributors everywhere. J. H. Williams & Co., Buffalo 7, N.Y.

WILLIAMS
DROP-FORGINGS AND DROP-FORGED TOOLS

Stop Abusing Your Tool Bits



Users say:
The first real tool holder improvement in 25 years!

Exclusive vise-grip jaw eliminates rocking, because it exerts equalized pressure over *full* length of cutter channel, and not just at one point. Screw-operated jaw runs right to cutting edge and hugs bit so it can't slip, can't sag, can't break!

Holds All Sizes and Shapes

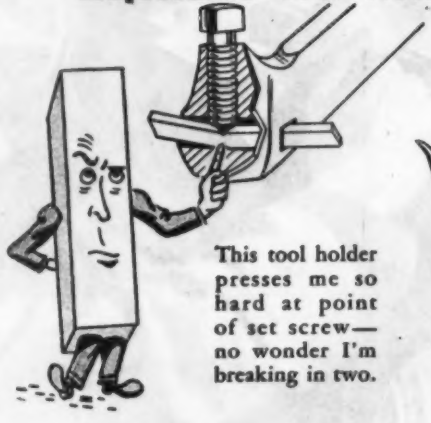
One Clark Adjustable Tool Holder takes 4 or more sizes of square, undersize, round or out-of-round, or narrow tool bits for cutting-off or special forming operations. Short bits and stub ends may now be used up.

For Carbide Tools and Boring Bars

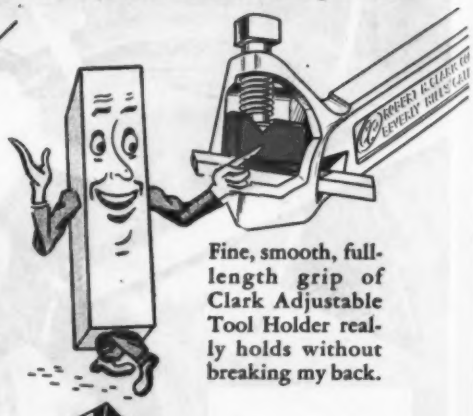
In addition to standard Clark Adjustable Tool Holder with 15° cutter channel, there's the Clark Parallel Tool Holder for better seating and better clamping action on carbide bits, threading tools, and boring bars.

For complete information about Clark Adjustable Tool Holder, call your Clark Cutter Jobber today, or write for catalog AM7-TH.

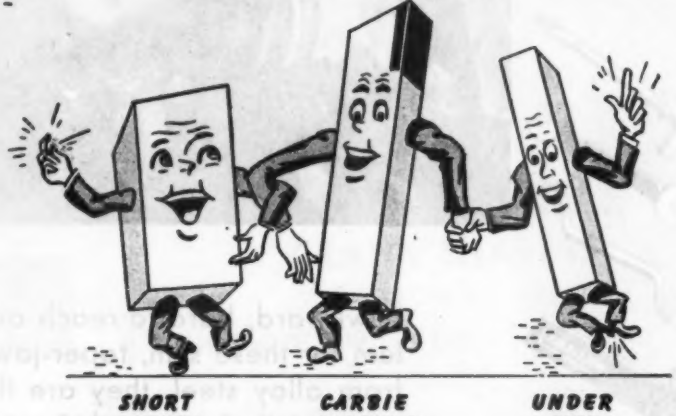
Change Now to Clark
Adjustable Tool Holder with Vise-Grip Jaw



This tool holder presses me so hard at point of set screw—no wonder I'm breaking in two.



Fine, smooth, full-length grip of Clark Adjustable Tool Holder really holds without breaking my back.



SHORT STUBBY

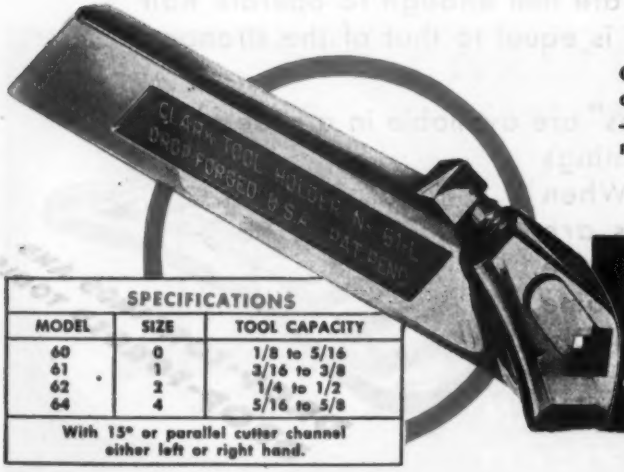
Clark Tool Holder is best for me—adds years to my life!

CARBIE CARBIDE

Boy! I like that extra support right to my cutting edge.

UNDER SIZE

Whee! Now I'm good for cutting-off or other operations.



SPECIFICATIONS		
MODEL	SIZE	TOOL CAPACITY
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 5/8
With 15° or parallel cutter channel either left or right hand.		

CLARK CUTTERS

Robert H. Clark Company

9330 SANTA MONICA BOULEVARD • BEVERLY HILLS, CALIFORNIA

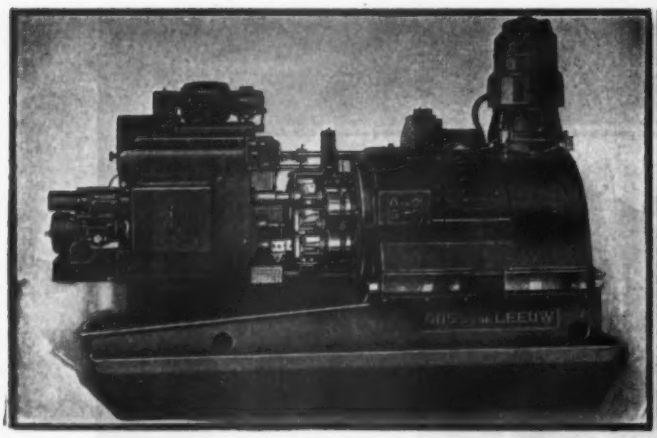
Avey
DRILLING
MACHINES

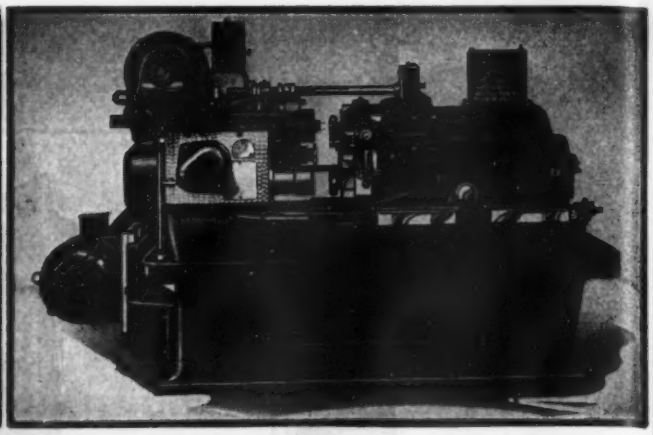
. . . IN THE PICTURE FOR 1945

Make sure it is in your production line for 1945. Avey Drilling Machines give longer operating hours, smoother performance and lower maintenance. They'll do your war job now, your peace job later. We illustrate the Avey Type MA-6 in No. 2 size (capacity in cast iron, 7/8"). No. 3 size (capacity in cast iron, 1 1/4"). One to six spindle units, either size. Six speed machine, two speed motor, three mechanical changes through gearing, 8 to 1 speed range. Push button control. MA-6 illustrated, has three spindles, the Avey-matic Feed, Hand Feed and Tapper.

THE AVEY DRILLING MACHINE CO.
CINCINNATI, OHIO, U. S. A.

Avey DRILLING MACHINES





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

See HOW THIS SPEEDS UP MULTIPLE DRILLING!

AUTOMATIC DRILLING UNIT WITH CENTRIFUGAL FEED

BY employing the principle of centrifugal force for feed pressure, and by regulating the rate of feed through the use of weights, the Govro-Nelson Automatic Drilling Unit makes it possible to perform multiple-drilling operations at a higher rate of feed than with fixed feed mechanisms

This is because the centrifugal feed automatically protects the drill against breakage should it encounter hard spots in the material—thus giving it a great advantage over fixed feed devices.

Designed for drilling up to ⅜", depending upon the material. Can be mounted at any angle or in any plane. (Illustration shows three units mounted vertically for drilling three 1.5 m/m holes at once in circular aluminum part).

WRITE FOR *Literature*

GOVRO-NELSON CO.
1933 Antoinette
DETROIT 8, MICH.

Automatic DRILLING UNIT

For EASIER DIE MAKING *Better* PROFITS

There's no need today to make small dies, models, metal patterns and jigs on machines rated for larger work. The LINLEY is ideally adapted for fast, accurate machining at minimum expense and with considerable saving of valuable toolmakers' time.

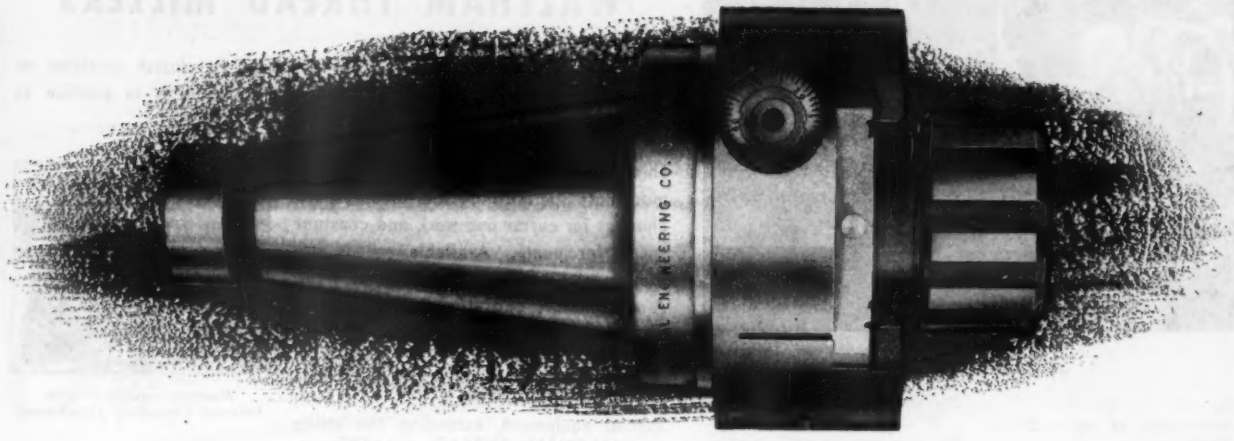
Choose the spindle speed you need . . . 275 to 4250 r.p.m. (8 selections). Get the benefit of Linley's easy set-up and fast changeover features. Use the direct micrometer setting for smooth, sure operation.

This is the unit you need to keep things moving now . . . and later, when there will be great need for new tooling.

SEND FOR BULLETIN

LINLEY BROTHERS COMPANY
664 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

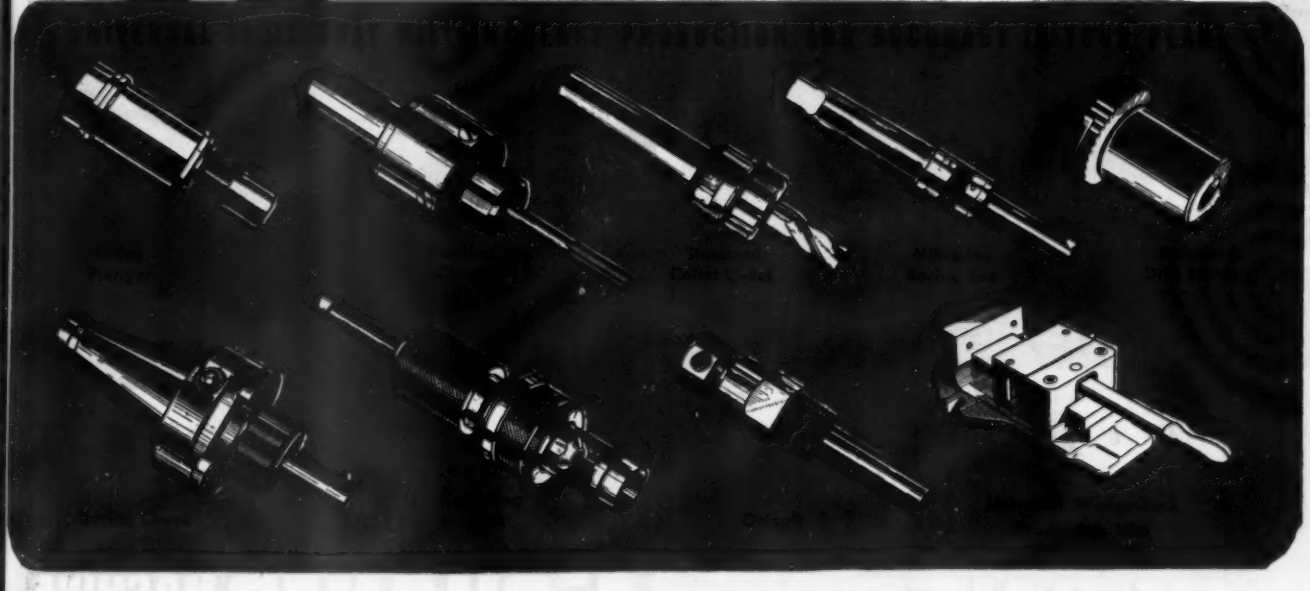
UNIVERSAL BORING CHUCKS GRIP TIGHT • IMPROVE ACCURACY • SPEED UP OPERATIONS



Universal Boring Chucks, made for boring mill and milling machine use, speed efficient boring at reduced cost because they are engineered to minimize chances for error and constructed to deliver dependable performance on the job year after year. Here are a few of the many advantages incorporated in the design and construction of these modern tools:

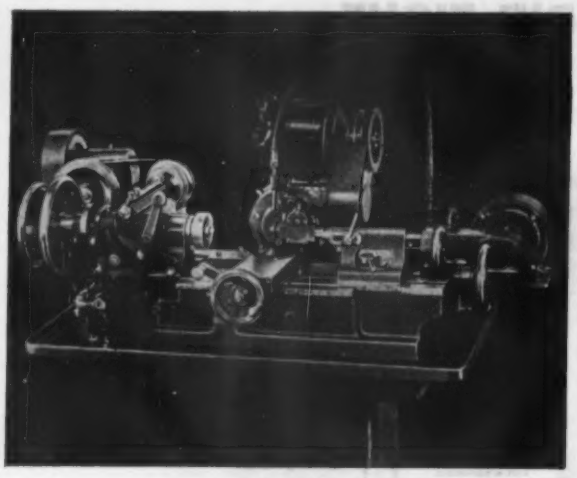
- Special design allows boring bar to be advanced or receded to a length to suit the work.
- All wearing surfaces hardened and ground.
- Anti-back-lash arrangement of adjusting screw permits extremely accurate setting of cut—accurate to .0005".
- Positive reference point to bring collet on center permits centering, drilling, etc., previous to boring operation.
- Flat retainers which grip slide are easily brought to proper adjustment by grinding face of chuck.
- Large feed dial can be adjusted to zero setting at any position in feed range.
- Made to accommodate bars from ⅜" to 1".

Write for complete particulars about Universal Boring Chucks and other superior Universal tools.



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN — Fighter Plane Given by Employees — Employee Bond Deductions



Fast, PRECISION THREADING *of* SMALL PARTS *Assured . . . by*

WALTHAM THREAD MILLERS

All standard forms of threads can be milled to closest precision on these fast, versatile, convenient machines. Waltham is in position to furnish the various cutters required.

Three motors are employed on WALTHAM machines, permitting individual speed changes for cutter and work and constant speed for pump. Available speeds are provided for cutting either brass or steel. A single start and stop station controls all motors.

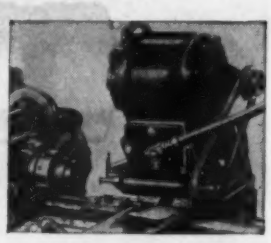
Specifications:

Swing over carriage—3"
Capacity—(dia. of work)—2" or smaller
Thread length (work on centers) —8¾"
Thread length (work chuck-held) —10"
Dia. hole through spring chuck—⅝"
Dia. hole through work spindle—¾"
Max. distance between centers—12"
Floor space—48" x 34"

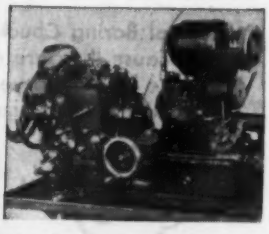
Write for Bulletin 244A

EXTRA EQUIPMENT

Special equipment, extending the utility of WALTHAM THREAD MILLERS, includes attachment for relieving, taper, internal threading, multiple cutter threading, translating gears, metric lead screw, cam operation, special tailstock for multiple cutter work.



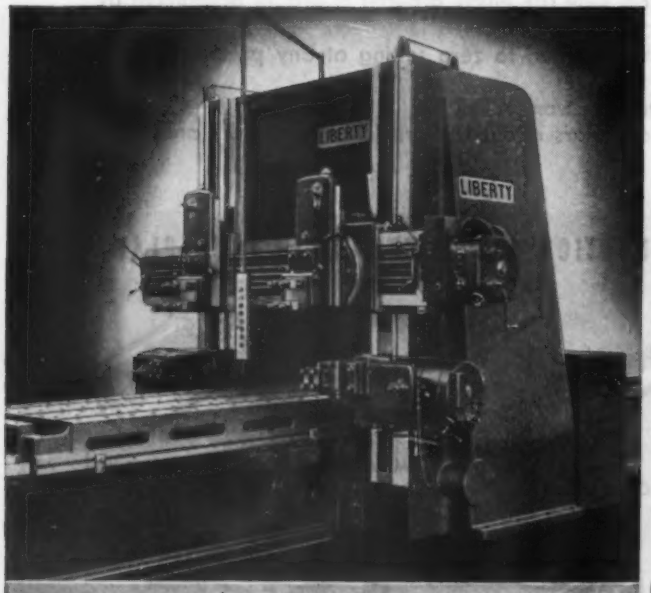
Machine equipped with Internal Threading Attachment



Machine equipped with Relieving Head

WALTHAM
TRADE MARK REGISTERED U.S. PAT. OFF.

WALTHAM
MACHINE WORKS,
WALTHAM, MASS.



LIBERTY

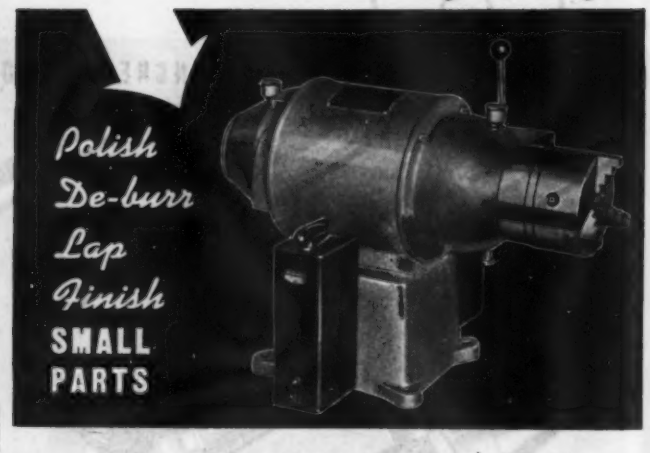
SMALL, MEDIUM AND HEAVY DUTY
PLANERS
FOR HIGH SPEED, LOW COST PRODUCTION

LIBERTY PLANERS • HAMILTON, OHIO, U. S. A.
Over a Quarter Century of Specialized Experience with Time-Tested Principles of Design

---

SPEED LATHES

for Secondary Operations



Schauer Ideal Speed Lathes insure finer quality, greater accuracy and uniformity, coupled with increased output and lower cost. A size and type for every finishing purpose. State YOUR finishing problem. Write for Catalog 440.

SCHAUER MACHINE COMPANY
ORIGINATORS OF TODAY'S SPEED LATHES
2067 READING ROAD - - - - - CINCINNATI 2, OHIO

LATROBE

Convenient warehouse service

Detroit

Hartford

Chicago

Philadelphia

For Reconversion Tool and Die Steels

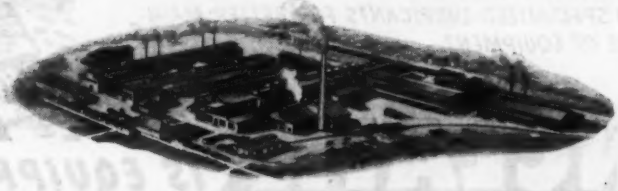
Toledo

Cleveland

We'd like to say, "Pick up the 'phone and call the nearest Latrobe Warehouse for the steel you want." But these are days when war production still has first call, and conversion tool and die steels will not always be available until the final victory. When they are, Latrobe's seven warehouses, together with sales offices in principal cities, will be able to give you the best in prompt, efficient tool and die steel service.

Make it a habit to call Latrobe first.

Latrobe ELECTRIC STEEL COMPANY



ARMY (E) NAVY

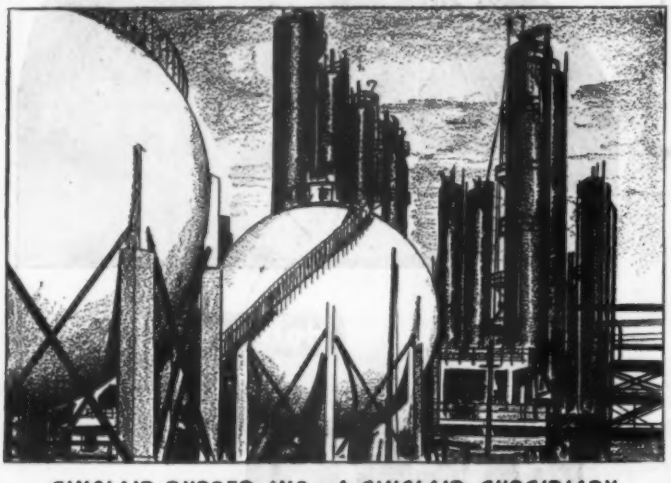
S-4

MAIN OFFICES *and* PLANT •• LATROBE • PENNSYLVANIA

HIGH SPEED STEELS · DIE STEELS · TOOL STEELS · STAINLESS-LATROBE RED ARROW FOR METAL-CUTTING TOOLS

Do you know that . . .

A TANK CAR TRAIN STRETCHING FROM WASHINGTON TO QUEBEC WOULD BE REQUIRED TO CONTAIN A SINGLE YEAR'S PRODUCTION OF CRUDE OIL FROM SINCLAIR'S 8000 WELLS.



SINCLAIR RUBBER INC., A SINCLAIR SUBSIDIARY, MANUFACTURED IN ONE YEAR SUFFICIENT BASIC MATERIAL TO PRODUCE 78,000 TONS OF SYNTHETIC RUBBER. THIS PLANT AT HOUSTON, TEX., IS SINCLAIR OPERATED FOR THE GOVERNMENT.

FOR FASTER MACHINING, FINER FINISH, AND LOWEST COST PER UNIT MACHINED SINCLAIR PROVIDES DIVERSIFIED CUTTING OILS SUITED TO ALL TYPES OF METALS . . . ALSO SPECIALIZED LUBRICANTS FOR BETTER MAINTENANCE OF EQUIPMENT.

SINCLAIR IS EQUIPPED TO SERVE YOU BETTER!

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

GET GREATER PRODUCTION AND ACCURACY ON MILLING WITH THIS AUTOMATIC INDEX BASE

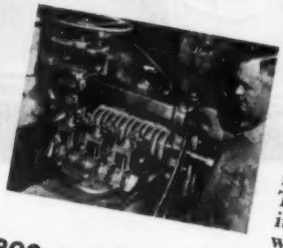
Here's a fast automatic index base that eliminates extra handling in repositioning parts for multiple cuts — has "built-in" accuracy for continuous reproduction to close limits — is thoroughly sealed against dust, chips, or oil — ideal for both "dry" and milling requiring coolant.

ACCURATE TO WITHIN .001" ON PERIPHERY

Spacing is controlled by indexing plunger which registers in accurately machined notches cut in the master plate. Notches are cut to provide accuracy within .001" on periphery of top plate.

● HOW TO APPLY THIS INDEX BASE TO YOUR WORK . . . Get our booklet covering the complete specifications of 8", 12", 18", 24" and 30" diameter automatic index bases. Typical applications, production applications and design details are also included. Write for your copy today. Ask for bulletin #138.

3 Typical Installations

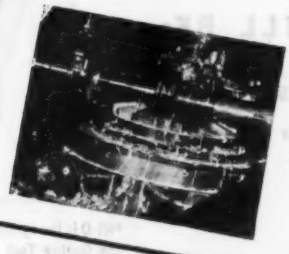


40% PRODUCTION INCREASE

Straddle milling two flats on both ends of this camshaft was increased 40% with a Sundstrand automatic index base. Two stations (180° index) make it possible to mill both ends without re-locating part.

800 PIECES MILLED PER HOUR

An eight station automatic index base eliminates "down-time" on this slotting operation. Operator loads and unloads parts during automatic cycling of machine.



INSURED ACCURACY

Accurate milling of this part is obtained with a 16 station automatic index base.

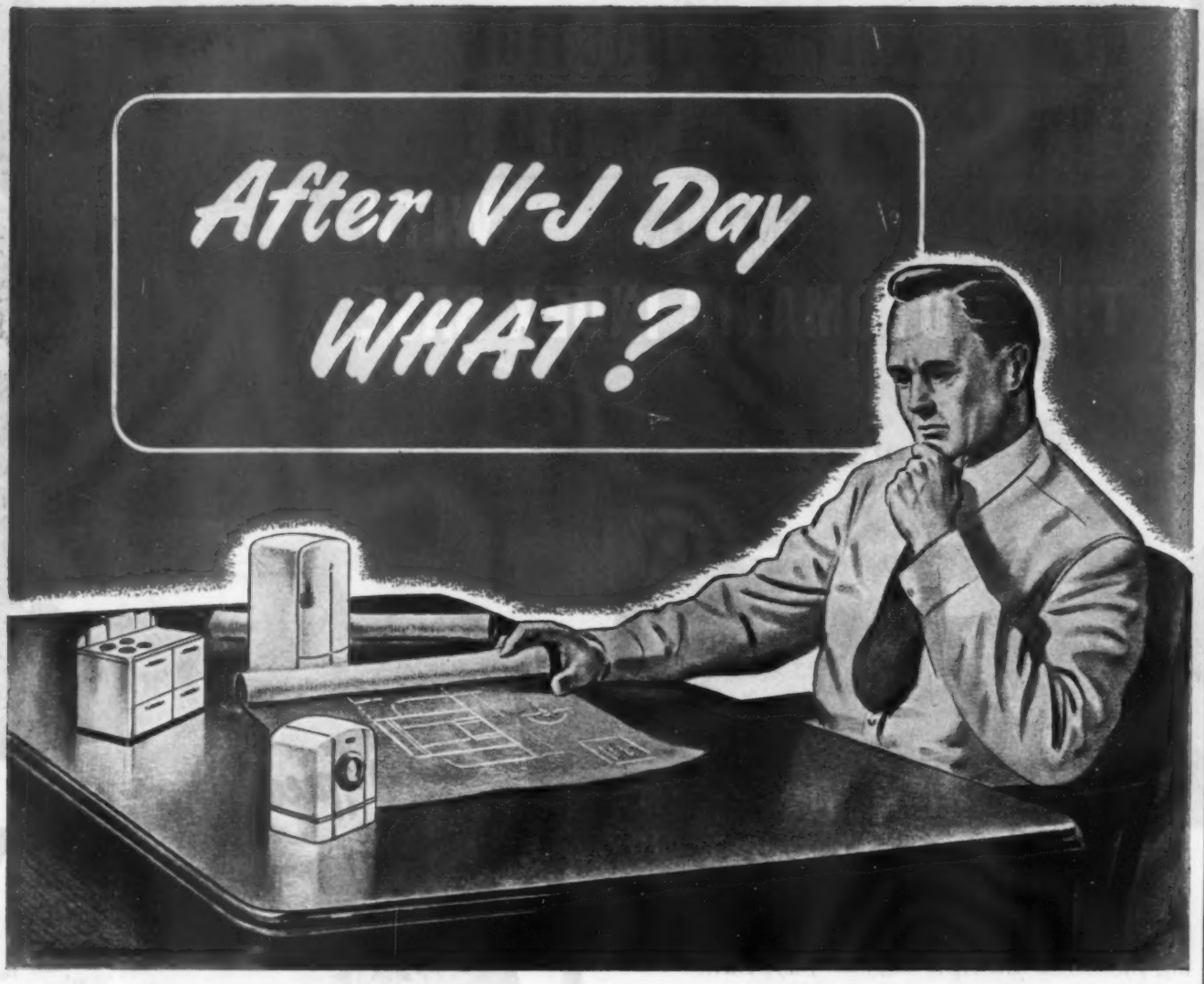
ARMY E NAVY

SUNDSTRAND MACHINE TOOL CO. ROCKFORD ILLINOIS U.S.A.

SUNDSTRAND MACHINE TOOL COMPANY

2533 Eleventh St. • Rockford, Ill., U. S. A.

RIGIDMILLS • AUTOMATIC LATHES • SPECIAL MILLING AND TURNING MACHINES



PROBLEM No. 1 WILL BE:

Tooling up your plant for Peacetime Production!

PROBLEM No. 2 WILL BE:

"Who is going to design and make those tools?"

*HI-Q is the symbol of the Spirit of the Quality Tool & Die Company

HI-Q* says:

"New techniques of tooling will be needed to handle new materials and streamlined designs. We have built our business on willingness and ability to handle the tough tooling jobs and come up with the right answers. We will welcome the opportunity of putting this tool-making skill to work for you."

QUALITY TOOL & DIE CO.

Manufacturers of "Quality" Products

401-15 NORTH NOBLE STREET, INDIANAPOLIS 2, INDIANA

HEADQUARTERS FOR ENGINEERED CUTTING TOOLS

A *Must* IN THE
PRODUCTION OF ILLINITE CUTTING TOOLS

To prevent decarburization or oxidation, a chemically balanced atmosphere is maintained in the high speed steel furnaces where ILLINITE Cutting Tools are hardened. This is an excellent example of the great care that is taken at every step to give you tools of the highest quality. But, Illinois Tool offers even more . . . an experience of thirty-two years in helping the leading industrial firms of America solve their metal cutting problems. Consult an Illinois Tool engineer—let him help you gain the benefits of ILLINITE Cutting Tools—specially engineered for your particular application!

ILLINOIS
TOOL WORKS

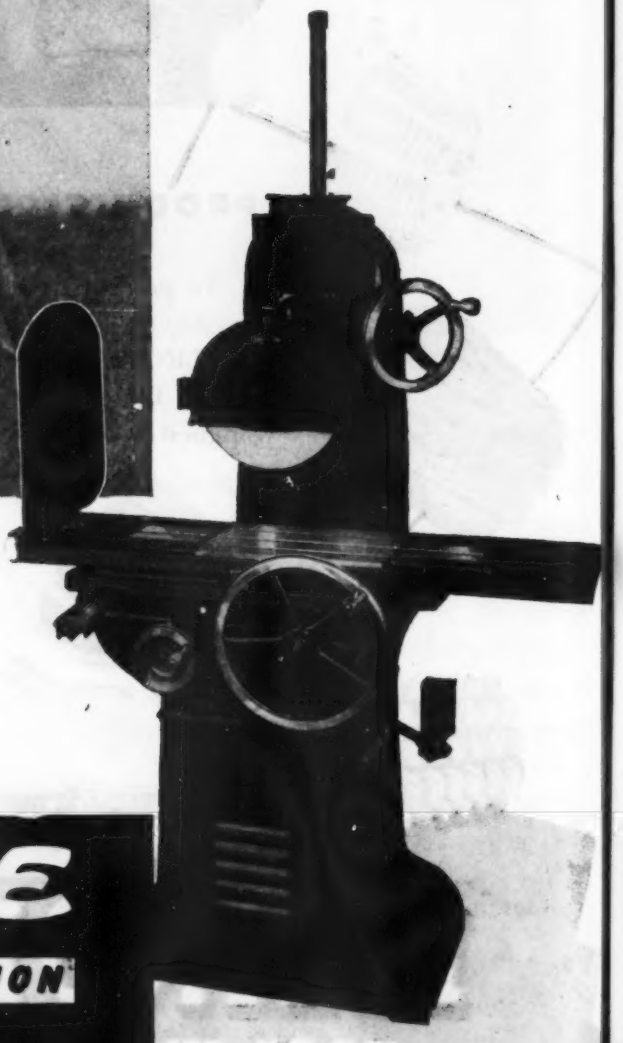
Overnight to All America . . .
From The Hub of Air Transportation

2501 North Keeler Avenue • Chicago 39, Illinois
In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario

OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

Grinding has come a long way since we were boys

ABRASIVE NO. 1½



The ABRASIVE No. 1½ Hand Feed Surface Grinder is producing work today—in accuracy, speed and variety—that is as far from the product of the old grindstone as walking is from flying! The ABRASIVE No. 1½ is a versatile machine with unusual capacity for grinding dies, flat work and gauges . . . it combines accuracy with speedy production. Convenient, large handwheels make operation easy; motor built integral with wheel head completely eliminates belts, sprockets and chains . . . minimizes vibration. Abrasive design assures years of satisfactory service.

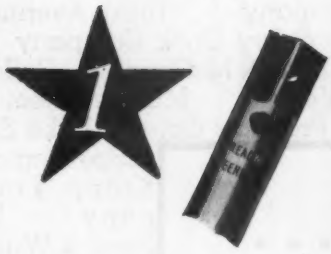
WRITE FOR CATALOG

ABRASIVE

ACCURACY BOOSTS PRODUCTION

Capacity: 15" long, 10" wide, 12" high

ABRASIVE MACHINE TOOL CO. • EAST PROVIDENCE 14, R. I.



Select your taps by *i-dot-ification*. Only a *Threadwell* carries the color dot on the shank for quick, sure identification — *red* dot for high speed cut thread, *white* dot for commercial ground thread, *blue* dot for precision ground thread.

Take a *tap-capsule*. Every *Threadwell* Ground Thread Tap is protected by its individual transparent plastic tube — sealed against dirt, rust and damage — visible for size and type without unwrapping.

Keep COLD-TEMPERED. All *Threadwell* High Speed Taps are *cold-tempered* at 120° below zero to give them greater strength through and through, yet increased ductility. They are ideal for tapping steels, cast iron and alloys as well as plastics and other abrasive materials. No extra cost.

5 WAYS TO GET "Tap-Happy"

Try *Threadwell personal attention* service. Your local *Threadwell* Tap supplier gets it from the factory and he was selected as a Threadwell distributor because of his ability to give prompt, intelligent *personal attention* to every tap order you place. Try him and see what it means to you.

Don't mess with greasy taps. Threadwell Taps are always clean, dry and shining. Threadwell greaseless rust-proofing keeps them that way.

Only Threadwell Taps give you all of these advantages. Remember that next time you order high speed taps and specify Threadwell COLD-TEMPER.

DISTRIBUTORS IN LEADING INDUSTRIAL CENTERS THROUGHOUT AMERICA

EXPORT STOCKING DISTRIBUTORS

CANADA, Bridge Machinery Co., Montreal;
ENGLAND, Skylux Ltd., London and John H. Graham and Co., Inc.
THROUGHOUT THE WORLD

Threadwell
SINCE 1902
"TAPS OF DISTINCTION"

THREADWELL TAP AND DIE COMPANY • GREENFIELD, MASSACHUSETTS, U. S. A.

CALIFORNIA OFFICE, THREADWELL TAP & DIE CO. OF CALIF., 1322 SANTA FE AVE., LOS ANGELES 21

Helping Reduce Costs . . .

Where you find a Buffalo Billet Shear in a forge shop—you know that billet preparation costs are LOW! Cutting steel for forging 24 hours a day Buffalo Billet Shears are contributing greatly to American war production.

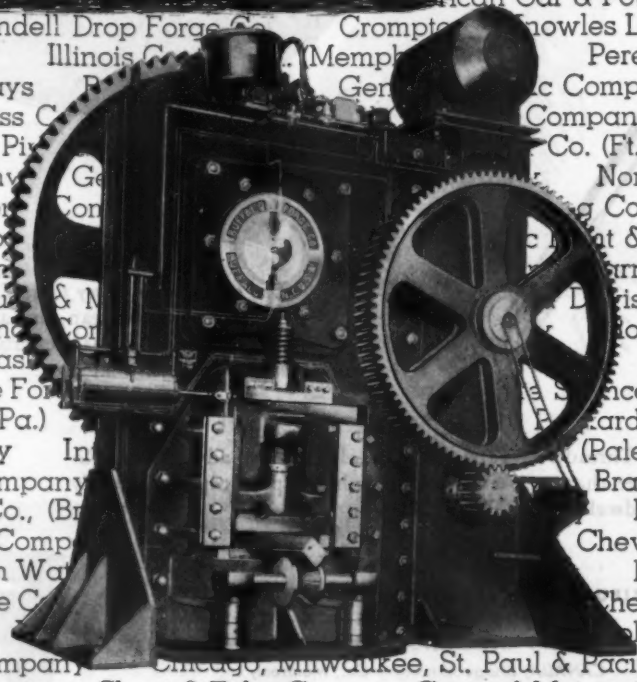
They will make equally impressive savings for peace time manufacturing.

Bulletin 3295 gives details

BUFFALO FORGE COMPANY

448 BROADWAY . BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



"Buffalo" BILLET SHEARS

Only Broaching CAN DO THIS DIFFICULT JOB ON JET PLANE ENGINES

● *The photograph above shows a Detroit Broach designed and built set-up for broaching the nesting grooves in the turbine wheel. The grooves are roughed out with the left hand broach and then the fixture is shifted to the right hand tool where the finishing cuts are taken.* ● *The shape of the cut is shown at the right. These grooves vary in different models, the largest being about an inch deep and three-quarters of an inch wide at the base.*

● The grooves that hold the buckets to the turbine wheel in our newest jet plane engines must be smooth and accurate beyond even the great smoothness and accuracy demanded by other precision war products because of the high stresses and tremendous speeds encountered in this type of engine. ● The only practical method of cutting these grooves is by broaching. No other process offers the speed, the accuracy, the fine finish that is obtained with broaches. Few peace-time products require such close adherence to specifications but in any peace-time product more speed means lower cost, more accuracy means a better product, better finish means better appearance, more sales. Call in a Detroit Broach engineer now, while you are planning new products. He will give you complete cost and production data on your own job without obligation.

BROACHING TOOL INSTITUTE

DETROIT *Broach* COMPANY

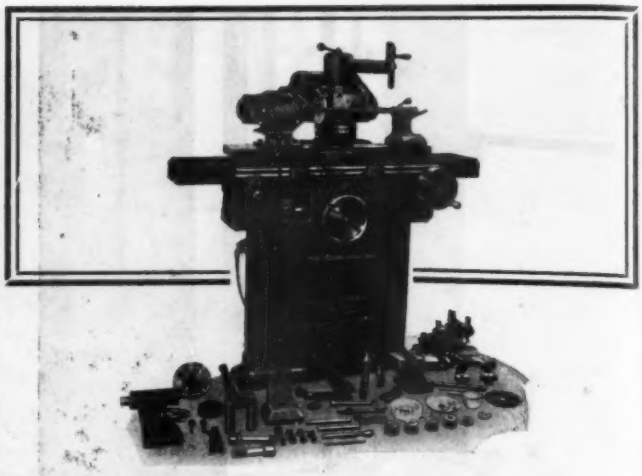
20201 SHERWOOD AVENUE • DETROIT 12, MICHIGAN
9308 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

CRITERION *Boring* HEADS

Accuracy Accepted

Extremely high accuracy is a standard feature of Criterion Boring Heads. Moreover, original accuracy is maintained far beyond normal expectation. Lead Screw is ground from solid AFTER hardening. Shanks interchangeable. Criterion Heads are in use throughout the nation. Order from your dealer. Request free literature.

CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA



GRAND RAPIDS NO. 60
UNIVERSAL CUTTER AND TOOL GRINDER

featuring:

- modern cabinet base
- hardened and ground table ways
- ball bearing table
- fixed table height
- one shot lubrication
- and many other important features

Illustrated Catalog containing complete details sent promptly on request.

GALLMEYER & LIVINGSTON CO.
330 STRAIGHT AVENUE
GRAND RAPIDS (4), MICH., U.S.A.

Saves EXTRA Tooling

Three spindle operations on

ONE SPINDLE DRILL PRESS

UNIVERSAL'S
DRILL PRESS TURRET HEAD

NEW **MODEL**

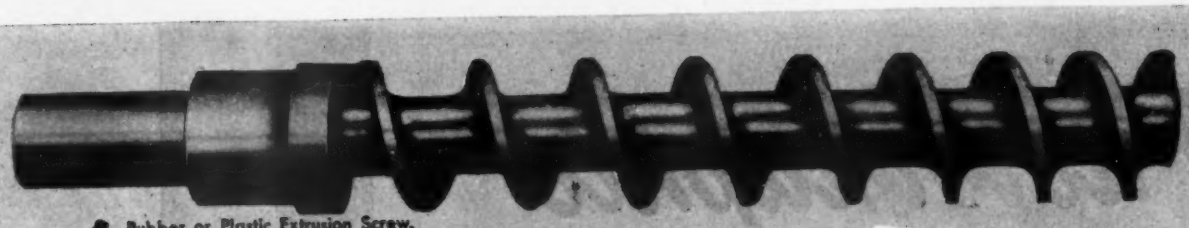
Complete New Design

100% Rigid and Accurate

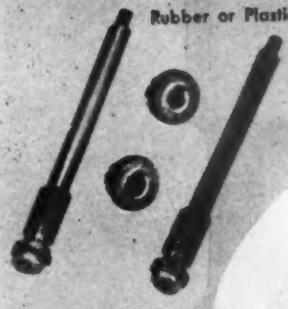
Sizes to fit any Drill Press. For complete data on this time saving Turret see your dealer. Write or wire today.

Universal Engineering Co.
2230-32 NATIONAL AVENUE • SAN DIEGO 2, CALIFORNIA

GENERAL SALES OFFICES
1249 Washington Blvd., Detroit 26, Michigan



Rubber or Plastic Extrusion Screw.



High Pressure Valve Seats

Stainless Steel Mixer Shaft and Bushing

Door Panel Draw Ring

COLMONOY NO. 4
Nickel base hard-facing alloy. Rockwell C hardness, 35 to 40. Specific gravity, 6.91. Melting point, 2025°F. Approximate composition %, Ni. 75-85. Cr. 8-14. B. 1-2. Balance Fe. Si. C. 7 max.

COLMONOY No. 4

RESISTS WEAR
RESISTS CORROSION
IS MACHINABLE

COLMONOY No. 4 is a versatile, all-around hard-facing nickel base alloy that has a wide field of application. It is ideal for the thousands of uses that require excellent resistance to wear and corrosion plus good machinability.

Colmonoy No. 4 has these properties—good resistance to wear and galling, and very high corrosion resistance. It can be machined readily with carbide tools. It can be cast.

This hard-facing alloy is available in cast welding rod form for oxy-acetylene application, as well as in special cast forms. It is but one of many grades of Colmonoy hard-facing alloys ranging in hardness from 15 to 68 Rockwell C. All grades are fully described in our general catalog.

Send for CATALOG

Covers complete line of standard Colmonoy hard-facing alloys, special alloys and engineering service.

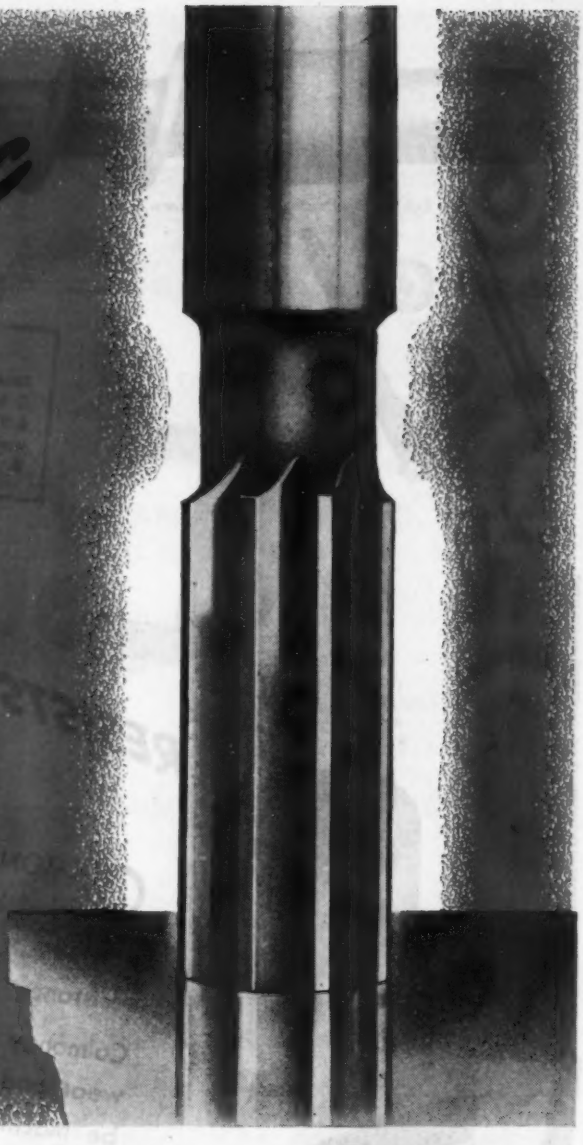
OFFICES

DETROIT, NEW YORK CITY, BUFFALO, CHICAGO, TULSA, LOS ANGELES, SAN FRANCISCO AND IN CANADA

WALL-COLMONOY CORP.

720 Fisher Bldg., Detroit 2, Michigan

Photographic Proof...



...that Morse Reamers on your job can mean money in your pocket!

See the mirror finish on this piece? That's the kind of work Morse Reamers do . . . work so accurate, so smooth-surfaced that internal grinding and other costly special operations are often unnecessary. For work that cuts out waste motion use Morse Reamers – put the savings in your pocket!

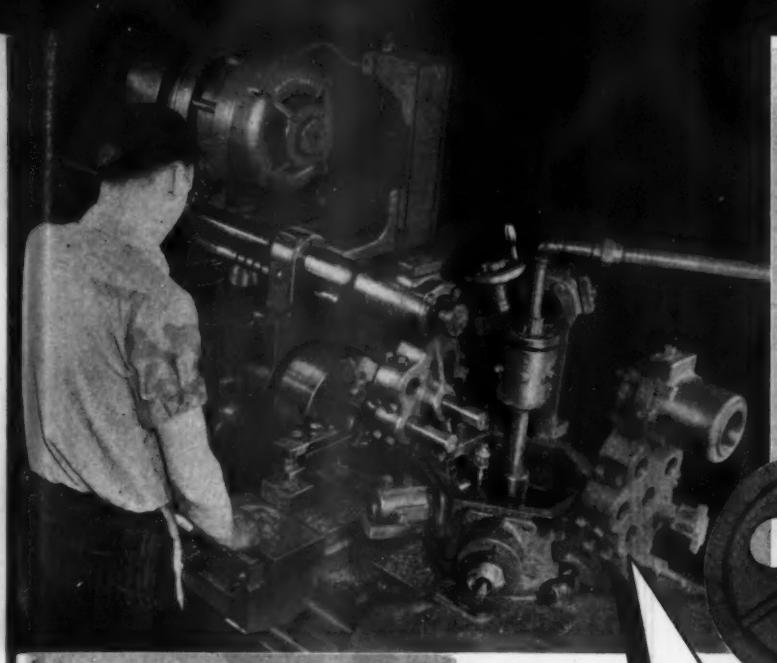
MORSE THERE IS A DIFFERENCE **TWIST DRILL AND MACHINE COMPANY**

NEW BEDFORD, MASS., U. S. A.

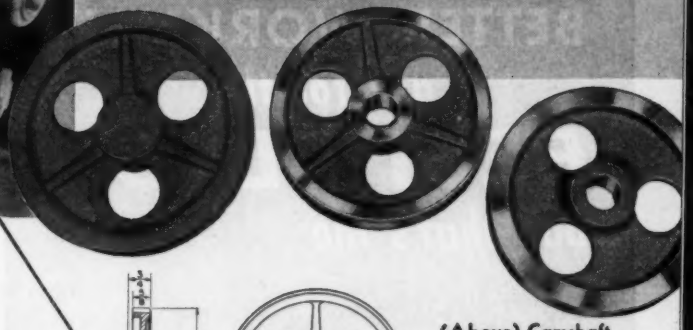
NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

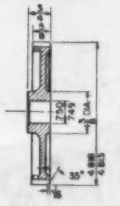
SAN FRANCISCO STORE: 1180 FOLSOM ST.

12 AUTOMATIC OPERATIONS PRODUCE GEAR BLANKS IN SINGLE CHUCKING



(Above) 2FU Fastermatic tooled to produce camshaft gear blanks in a single chucking.



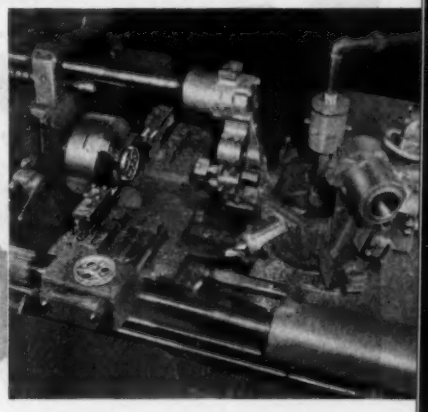


(Above) Camshaft gear blank before & after machining.

(Left) Outline drawing of gear blank.

Fastermatic Uses 4 Speeds and 5 Feeds Changed Automatically . . . Reduces Floor-to-Floor Time to 2 Minutes 57 Seconds

(Right) Close-up view of tooling used.



Twelve machining cuts are made on this camshaft gear blank in one chucking of the work. Both sides of the blank are machined automatically and all operations are completed with the exception of cutting off the hub on the chuck side. Four speed changes and five feed changes are used to rough and finish straddle face, drill, turn, bore, ream and chamfer the hub, and cut the radius on the reverse side of the gear blank. Actual machining time is 2 minutes, 7.3 seconds, with 49.7 seconds allowed for loading, aligning and unloading the gear blank casting.

Completely Automatic Machining Cycle

The Fastermatic not only permits multiple tooling that maintains accurate and concentric dimensions and eliminates rejects, but also increases production and reduces machining costs due to its completely automatic machining cycle. The operator has only to load, start and unload the machine. Speeds and feeds are predetermined to obtain maximum cutting tool efficiency on the material being machined. Correct feeds and speeds automatically engaged for each work diameter result in greatly increased tool life. Automatic cycling is obtained through the flexible hydraulic system of the Fastermatic which is controlled by simple, standard cams for feeding and adjustable buttons on a master spool for speeds.

Profit by Using a Fastermatic

Now is the time to survey your present and future machining work to learn how Foster Fastermatics can increase your production and reduce costs. Simple jobs as well as intricate work in long or short runs can be handled more profitably with this automatic turret lathe. Let Foster engineers help you analyze your machining problems and recommend the Fastermatic and tooling best suited to your needs.

FASTERMATIC PRODUCTION RECORD

Part—Camshaft Gear Blank.
Material—Cast-Iron Alloy.
Holding Method—Logan Pneumatic Chuck (chucking in cored holes).

Speeds—	*Feeds*—
1st Position—151 R.P.M.	1st Position—.018"
2nd Position—277 R.P.M.	2nd Position—.0361"
3rd Position—277 R.P.M.	3rd Position—.0171"
4th Position—151 R.P.M.	4th Position—.0214"
5th Position— 94 R.P.M.	5th Position—.0019"

Machining Time—2 minutes, 7.3 seconds.
Loading and Unloading—49.7 seconds.
Floor-to-Floor Time—2 minutes, 57 seconds.

FREE . . . To Executives and Production Men who want complete facts and details on actual case histories of what Fastermatics are doing in the field. Write to Foster Division, 1100 Beardsley Avenue, Elkhart, Indiana, for your copy of the Production Data Book.

INTERNATIONAL MACHINE TOOLS

Foster Division - Elkhart, Indiana

INTERNATIONAL DETROLA CORPORATION

DETROIT, MICHIGAN • ELKHART, INDIANA • INDIANAPOLIS, INDIANA

FOSTER FASTERMATICS • LIBBY HEAVY DUTY TURRET LATHES • STANDARD TOOLS • SUPERFINISHING MACHINES • SPECIAL MACHINE TOOLS

BETTER WORKMEN
ask for the
BEST BLADE
and that's the

STAR HACK SAW BLADE

A master tool for industrial workmen — plant electricians, plumbers, maintenance men, garage mechanics, and even for the handyman householder.

The Star "Moly*" High-Speed Steel blade is recommended for jobs where speed and accuracy must be combined. The Star Unbreakable Special Flexible blade is ideal for all-around cutting where toughness and a certain flexibility are important.

*T. M. Reg.—Blades bearing the name "MOLY" are made only by Clemson Bros., Inc., and affiliated companies.

TRADE MARK

8134

CLEMSON

CLEMSON BROS., Inc., Middletown, N. Y.
Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson D-17 lawn machine.

Hammond
OF KALAMAZOO

"Good Machinery Since '82"...

This slogan we try to live up to and improve upon with each passing year. Having come to leadership in our field we strive to maintain our responsibilities through sound progress contributed by a balanced team of younger and older heads.

Our machinery lines include: Carbide Tool Grinders, Abrasive Belt Grinders, Polishing and Buffing Lathes, Automatic Polishing and Buffing Machines and Cylindrical Finishing Machines. Broadly, these are in the finishing field and you can look to us for up-to-date solutions of your finishing problems.

Lee Hammond PRESIDENT

Hammond Machinery Builders INC.

1618 DOUGLAS AVE. - KALAMAZOO 54, MICH.
Eastern Branch: 71 W. 23rd St., New York 10, N.Y.

For greater *accuracy, speed* and *economy* in *your* thread cutting

MODERN

STATIONARY TYPE SELF-OPENING

DIE HEADS

Modern Self-Opening Die Heads thread diameters from ½" to 7" in standard heads, and up to 14" in special heads . . . accurately, fast, and economically. They are adapted to practically every thread cutting operation within their capacity. Designed for use in hand screw machines, turret lathes, and other machines where the die heads are used in a stationary position.

- Wider threading range with greater flexibility. Unusually well suited to general purpose diversified threading work.
- Soundly designed and carefully built to insure maximum productiveness combined with long lasting, accurate service.
- Made with the least number of parts. Hardened and ground throughout. Wear is held to a minimum.
- Simplified design makes chaser change quick and easy. No special tools required.

PROMPT SHIPMENT....USUALLY FROM STOCK

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

IT'S NEW!

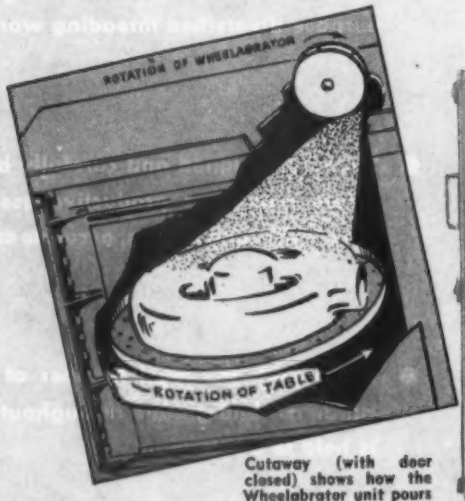
THE WHEELABRATOR Swing Table

Another in a long list of important blast cleaning developments pioneered by American is the NEW Wheelabrator Swing Table shown below.

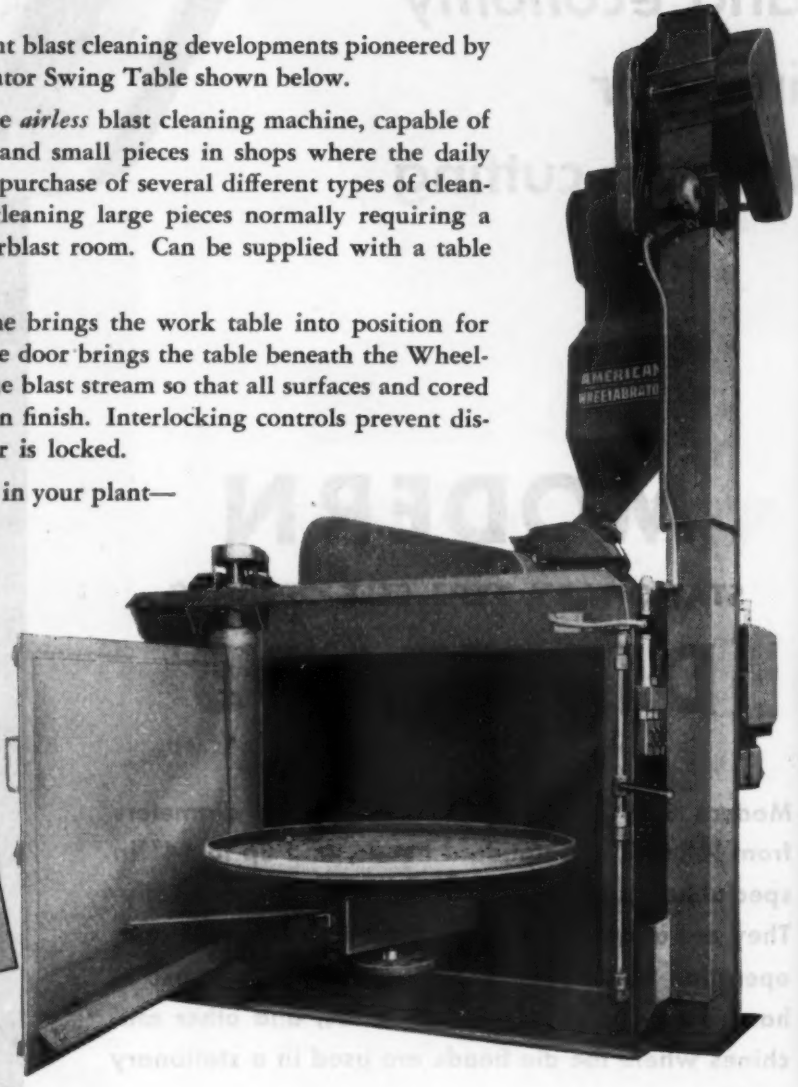
This is a versatile general purpose *airless* blast cleaning machine, capable of handling a wide range of large and small pieces in shops where the daily production does not warrant the purchase of several different types of cleaning equipment. It is ideal for cleaning large pieces normally requiring a laborious hand blasting in an airblast room. Can be supplied with a table 24", 66", 72" or 86" diameter.

Opening the door of the machine brings the work table into position for loading or unloading. Closing the door brings the table beneath the Wheelabrator where it rotates within the blast stream so that all surfaces and cored areas are scoured to a bright clean finish. Interlocking controls prevent discharge of abrasive until the door is locked.

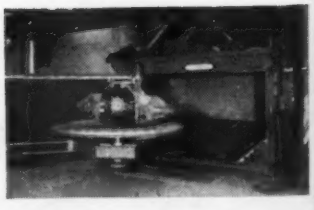
Put this machine to profitable use in your plant—write for full details today.



Cutaway (with door closed) shows how the Wheelabrator unit pours a continuous stream of abrasive upon the work to the full width of the table.



A 66" Wheelabrator Swing Table used by Ottumwa Iron Works, Ottumwa, Iowa, has cut cleaning costs 25 per cent and reduced cleaning time to 8 minutes per table load, in cleaning steam drum winches, electric hoist castings and miscellaneous gray iron castings.



The 86" Wheelabrator Swing Table at the Link Belt Ordnance Co., Chicago, cleans large parts for anti-aircraft and howitzer gun carriages in about one-fifth the time formerly required for hand blasting in a large airblast room.

American FOUNDRY EQUIPMENT CO.

317 S. BYRKIT, STREET
MISHAWAKA, INDIANA

RED CUT SUPERIOR

TUNGSTEN 17.50—18.50% CHROMIUM 3.75—4.25% VANADIUM .95—1.15%

6·6·2

TUNGSTEN 5.50—6.00% MOLYBDENUM 4.50—5.00% VANADIUM 1.40—1.75%

VASCO M-2

TUNGSTEN 6.00—6.75% MOLYBDENUM 4.75—5.25% VANADIUM 1.75—2.05%

8·N·2

TUNGSTEN 1.30—1.80% MOLYBDENUM 8.00—9.20% VANADIUM .90—1.30%

Our customers select the brands best suited to *their* needs . . .

Vanadium-Alloys

STEEL CO. LATROBE, PA.

Colonial Steel Division · Anchor Drawn Steel Co.

GREAVES No. 2

PLAIN or UNIVERSAL MILLING MACHINE

. . . for Speed, Accuracy, Production and Tool Room Work . . .

featuring:

- Power Feeds, all Directions
- Rapid Traverse—6-way
- Alloy Hardened Gears
- One Shot Lubrication to Table, Saddle Slides and Screws
- All Speed and Feed Changes through Positive Gearing
- All Speed and Feed Gearing run in Oil
- Timken Bearings
- Glass Sight Oil Control
- Unit Construction
- Central Control Position for all Operation Levers
- Coolant System

Specifications

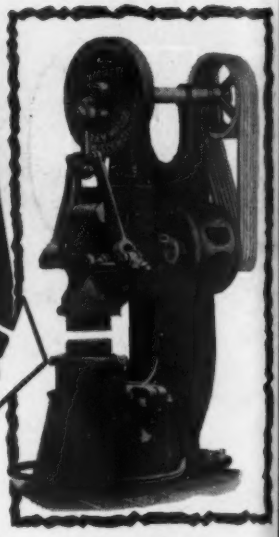
Table—52¼" x 12"
Feed range—Longitudinal Power Feed 28"
Cross Power Feed 10"
Vertical Power Feed 19"
Overarm—4½" diameter
Spindle—Chrome nickel steel National Standard taper hole #50
Speeds—18—Range 20-1000 RPM Reverse on all speeds
Feeds—9—Range ½" to 18" per minute
Rapid traverse — Longitudinal — cross and vertical—All directions—75" per minute
Weight—3750 lbs.

Send for illustrated literature giving complete information.
Write for nearest agent or dealer

Exclusive Distributors

H. LEACH MACHINERY CO.
387 CHARLES STREET PROVIDENCE, R. I.

YOU CAN DO A WIDE RANGE OF MAINTENANCE WORK—*Murray* POWER DRIVEN FORGE HAMMER



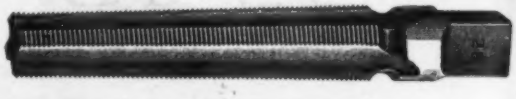
SHARPENING tools is just one of the many jobs you can do with a Murray Power Driven Forge Hammer. It is adaptable for a wide range of light or heavy work, even production work, as it is extremely powerful and built for long, dependable use, with low maintenance costs . . . adjustable for different thicknesses of materials and dies. This is *not* a steam hammer, but is operated either electrically or mechanically. All models can be furnished with motor drive as illustrated, or for belt drive. Write for complete details, and ask about our repair parts service, if you have a power hammer in your plant.

Made in 5 Sizes

25, 50, 100, 250, and 500 lbs. ram. Shown above is 250 lb. ram.

D. J. MURRAY MANUFACTURING CO.
WAUSAU MURCO **WISCONSIN**

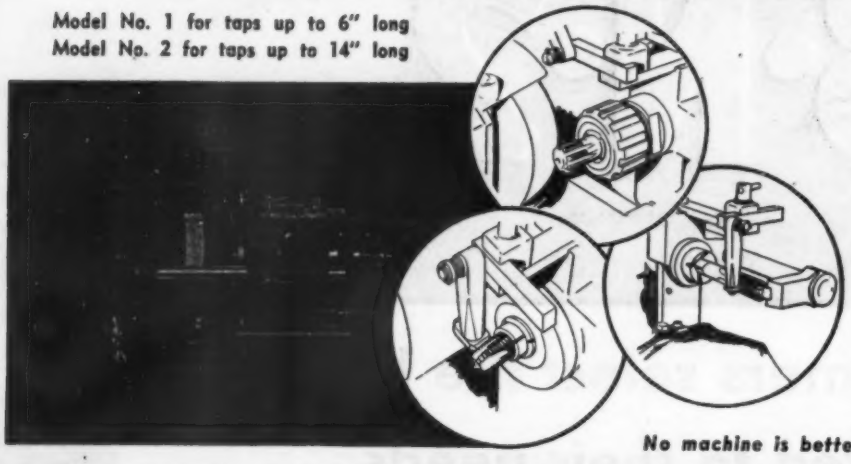
"Blacksmith" and "Bicycle" Taps



"GAY NINETIES" TAPS AND SHARPENING METHODS ARE OUT . . .

Be Modern — SHARPEN TAPS ON A *BLAKE* TAP GRINDER

Model No. 1 for taps up to 6" long
Model No. 2 for taps up to 14" long



In the days of "Blacksmith" and "Bicycle" taps, a taper thread was used to assure a fit on the screw *somewhere* in the hole. With modern precision taps, standards of fit are measured in "tenths" to assure contact *everywhere* on the threads. Such tolerances must be held throughout the life of every tap—must be held during every sharpening. That's where the Blake Tap Grinder comes in. Here is a modern machine offering a modern method for keeping taps at original sharpness. Here is a machine that will sharpen the chamfer on left- or right-hand taps with 2, 3, 4, 5, 6, 8, or 10 flutes. And you have your choice of methods for holding the tap—on the shank—on the thread—on the centers.

No machine is better than the cutting edge of the tool it uses.

EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE.
NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS

Please send me Bulletin No. 544 which describes the Blake Tap Grinder in detail.
A.M.

Name..... Title.....
Company.....
Street.....
City..... State.....

PERFORMANCE records of Cleveland Twist Drills and other tools prove their superiority beyond question. Over and over they illustrate the money-saving, work-saving qualities that are built into every Cleveland tool. Remember, to get the largest number of holes per grind, be sure to investigate Cleveland Drills.

• Your Industrial Supply Distributor can be mighty helpful in solving your retooling problems. Just as he worked with you in normal times before the war, and during the conversion era . . . so now he stands ready to help you again.

Today as always, it pays to

Telephone your

* INDUSTRIAL SUPPLY DISTRIBUTOR FIRST!

ARMY NAVY ARMY E NAVY

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

20 THOMAS ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD. DETROIT · BRUNEL ROAD, OLD OAK COMMON LANE, ACTON, LONDON W. 3, ENGLAND

CLEVELAND DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

Get More Cuts Per Hour and More Hours Per Machine with

SIMONDS "Red End" HACKSAW BLADES

THESE rugged "Red End" Blades for power-machine use are made to take the toughest service, *and to keep on taking it.* Smoother, straighter cutting . . . higher production . . . longer blade life . . . all these *extras* are now possible through Simonds 100% quality-control, and through Simonds new scientific method of tensioning power hacksaw blades to each particular job on which they are used. "Red End" Blades are made from Simonds own special electric steel, either standard, molybdenum, or high-speed. Order from your dealer *now.*

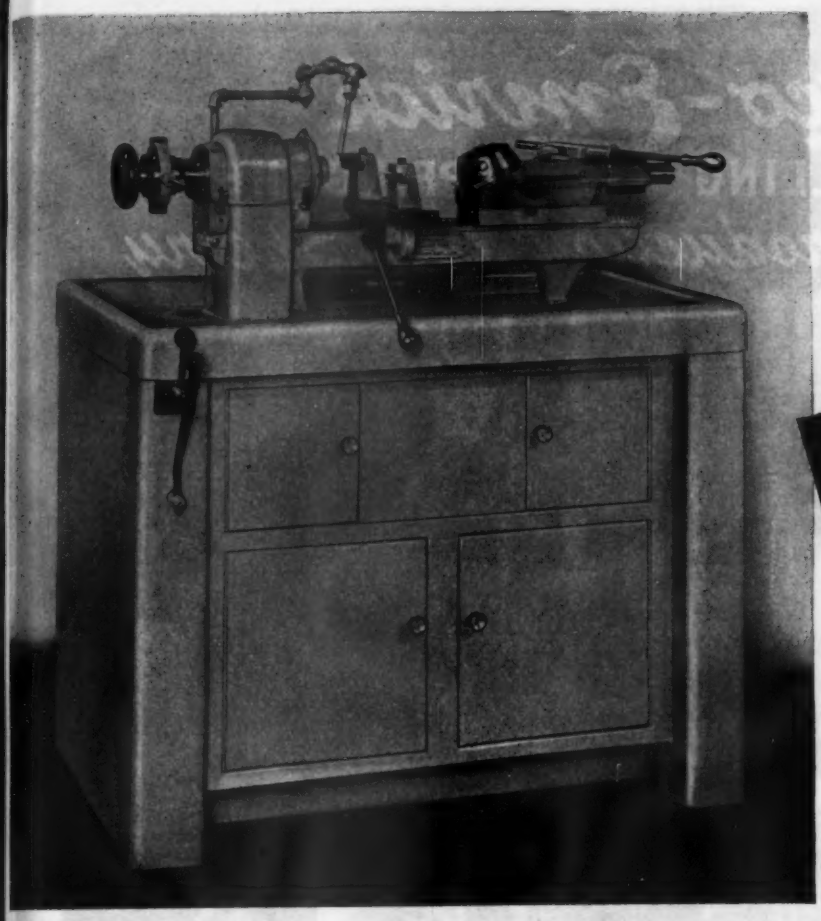
SEE SIMONDS NEW SOUND FILM, 16 mm in full color, showing how to choose the right "Red End" Blade for each job, and how to get the most out of it *on the job.* Have your dealer arrange to show it to *your* operators, in your own shop, without cost or obligation.

BRANCH OFFICES: 1350 Columbia Rd., Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash.

PRODUCTION TOOLS FOR CUTTING METAL, WOOD, PAPER, PLASTICS

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASSACHUSETTS

CUT THE WAR SHORT . . . BUY WAR BONDS . . . AND THEN BUY MORE WAR BONDS



PRECISION HAND SCREW MACHINE UNITS

You Can Speed Production and Reduce Costs On Precision Screw Machine Work With These Efficient Wade Units

Wade

Bench Lathes and Profilers For Precision, Versatility And Stamina

You can do more work at a lower cost with Wade Standard Precision Hand Screw Machine Units for they are built especially for precision production operations. They are soundly designed and built to turn out extremely accurate work.

Some of the features of the Wade Standard Precision Screw Machine Unit are: Headstock has double row roller bearing. Lever Closer runs on ball bearing; operates positively to open or close collet with instant movement. Double Cross Slide movement 2¾"; provided with adjustable stops. Automatic Turret Attachment; Tilted self-clamping 6-station head; takes ¾" shank tools; Adjustable stops index automatically. Turret working travel 3¼"; indexing travel 1"; total 4¼". Unit has 32" bed. Collet cap: Model #5, ¾"; #7, 1". Weight, with steel cabinet, 650 lbs.

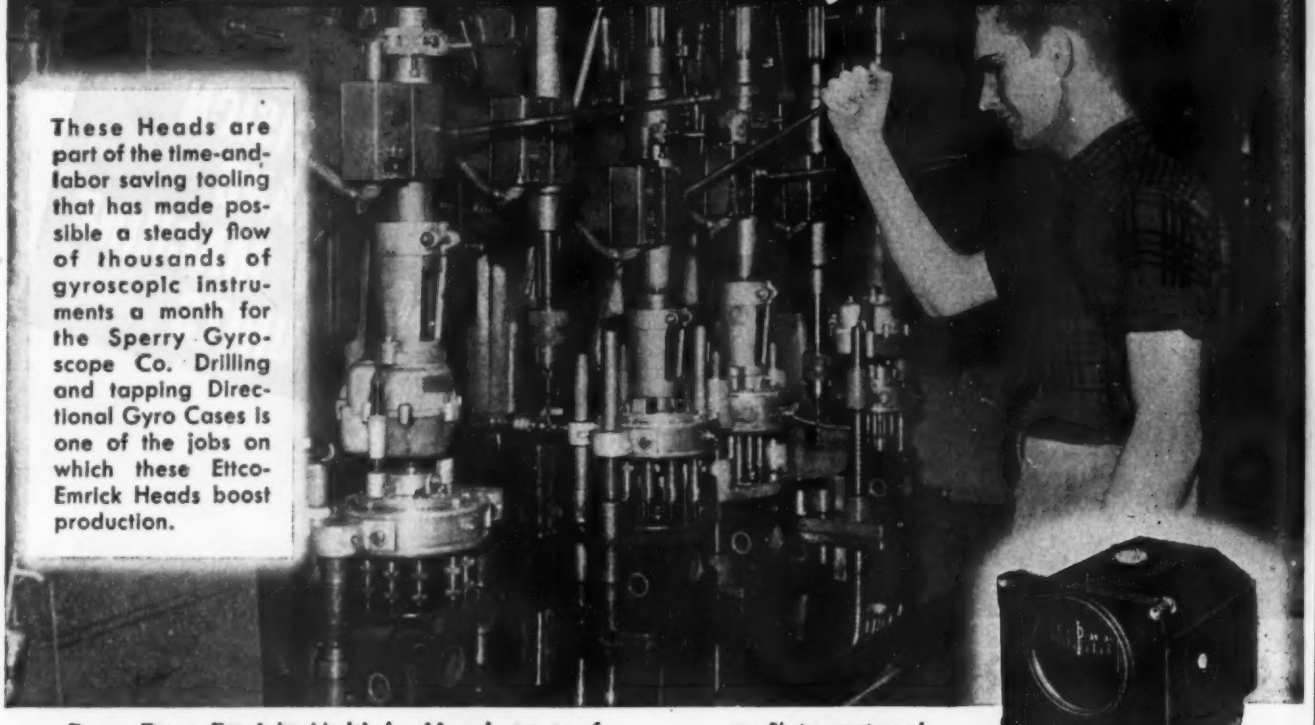
Write For Bulletins

THE WADE TOOL COMPANY

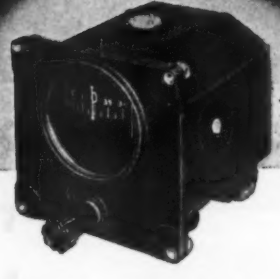
WALTHAM 54, MASSACHUSETTS

Ettco-Emrick

MULTIPLE DRILLING AND TAPPING HEADS *speed up production for Sperry*



These Heads are part of the time-and-labor saving tooling that has made possible a steady flow of thousands of gyroscopic instruments a month for the Sperry Gyroscope Co. Drilling and tapping Directional Gyro Cases is one of the jobs on which these Ettco-Emrick Heads boost production.



Photos courtesy of Sperry Gyroscope Co., Inc.

Four Ettco-Emrick Multiple Heads—two for tapping and two for drilling—convert this standard 6-spindle gang drill into a fast production machine. Blank cases come in at one end and go out the other, with the Multiple Heads doing the following operations in sequence. 1st Head drills 9 No. 33 holes. 2nd Head taps 6 holes for #6-40 screws—3rd Head drills 4 No. 33 holes and 2 No. 43 holes —4th Head taps 4 holes for #6-40 screws and 2 for #4-40 screws. The two spindles with single drills are used for deburring and countersinking between drill and tap operations.

Tied in with each Head is an Ettco-Emrick fixture which automatically positions and clamps the cases, facilitating and speeding up the progressive flow from one operation to the next.

As compared with the older single-spindle method of doing such work, these Multiple Heads greatly increase output with savings in man-hours and machine-hours that quickly return their cost.

FOR MAXIMUM PRODUCTION AT MINIMUM COST ON SMALL PARTS DRILLING AND TAPPING

Consult **ETTCO . . .**

Send drawing or sample part for Multiple Head recommendations. For more information write for the "Multiple Head Reprints".

ETTCO TOOL CO.

590 Johnson Ave., Brooklyn 6, N. Y.

Detroit 1 *Chicago 6*

Over 25 years specialization in solving Industry's drilling and tapping problems

2 TO 5 TIMES LOWER GRINDING COSTS

CARBIDE-TIPPED TOOLS AND DIES GROUND BETTER

Faster, cheaper precision grinding of carbide-tipped tools and dies is now possible! Green silicon carbide—the hard-hitting grain—is back from the war in Por-os-way wheels. No burning or discoloring with *this* wheel. Give it a try.

AND WHAT a job Por-os-way *users* are doing. Machinists everywhere say it's a pleasure to work with this remarkable precision grinding wheel, and they have impressive proof that it's profitable, too. Fewer rejects, increased production, longer wheel life, lower grinding costs . . . you can expect all these with Por-os-way. Por-os-way's unique *open structure* means faster, cleaner, cooler cutting of hardest metals. It cuts deeper when rough grinding, cuts smoother when precision finishing. Favorite wheel of the men at the machines, Por-os-way will be your favorite, too, when you see output soar, costs tumble, and you get the boss's welcome approval. Call in a Por-os-way engineer and let him put Por-os-way through its paces on any job you choose. A trial will more than convince you! A. P. de Sanno & Son, Inc., 430* Wheatland St., Phoenixville, Pa., Since 1893.

LIVE BETTER after the war . . . but only in a progressive, cooperative America—with high production, fair wages, helpful laws and sensible taxes.

*T. M. Reg. U. S. Pat. Office

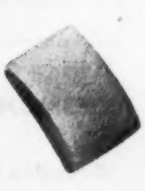
LOOK AT THE DIFFERENCE!

Your eye tells you at a glance why Por-os-way is *different.* See the *extra porosity* that gives you over 8 distinct operating advantages!

*T. M. Reg. U. S. Pat. Office

TAKE THE "RACKET" OUT OF SURFACE AND FACE GRINDING!

No moan, no groan, no grunt when you surface grind with Por-os-way segments. Por-os-way's sharp edges dig deep—cutting the metal, not "scraping" it off. Por-os-way cuts faster, cleaner, requires less dressing. Let it do a job for you!



RADIAC*

POR-OS-WAY*

The Precision Grinding Wheel

THE WHEEL THAT COSTS THE MOST AT FIRST . . . COSTS THE LEAST AT LAST

LARCO POLISHED DIAMOND TOOLS

polished expertly to all requirements—top-notch performance guaranteed!

The experience of four generations of diamond artisans is available to you.

write, wire, or phone your problem to LARCO's Diamond Engineers. They *know* the answers!

MUrray Hill 2-6356

COPYRIGHT 1945, LARCO DIAMOND TOOL CO.

3 quick ways to get the polished diamond tool you want:

3

BLUEPRINT
your blueprints followed accurately, down to amazingly close tolerances.

DUPLICATION
the steel or carbide tool you are now using can serve as the model.

PROBLEM HISTORY
a history of your problem will make it possible for us to give you the right "prescription"

3 proven ways for guaranteed performance:

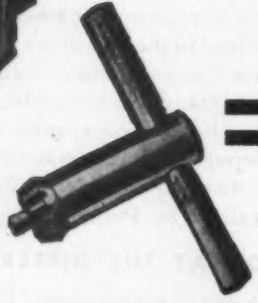
3

SEND SAMPLE
send us one rough piece of work you wish finished, we will finish this sample before final tool is submitted.

MODEL
a steel model actually a facsimile of the finished diamond tool is submitted for final approval.

INSTRUCTION
the hows, whys, and wherefores of the tools LARCO creates are carefully and precisely summarized in order to assure you of efficient usage and maximum results.

Almond Drill Chuck



The Original Manufacturers of Drill Chucks

As Pioneers in their field, ALMOND THREE-JAW DRILL CHUCKS have played an important part in machine tool development. They were the first to be placed on the market more than seventy years ago.

Types and sizes are available to fit all machine tools and portable drills.

Write for complete information.

T. R. ALMOND MFG. CO.
ASHBURNHAM, MASS., U.S.A.

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

Giant KEYSEATERS

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

GRINDING WHEEL DRESSER

Desmond Cutter

Desmond Hex Dresser

We manufacture a complete line of Dressers and Cutters. Write for copy of catalog "A".

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
Canadian D-S Mfg. Co., Hamilton, Ont.

ARMY E NAVY

Plug in on VASCOLOY-RAMET National Tool Service

- BROADWAY 3111 — 536 W. Wisconsin Ave.
- PLEASANT 3212 — 3100 Humboldt Ave., South
- CHESAPEAKE 1255 — 1440 W. Randolph St.
- BLACKHAWK 1088 — Talcott Building
- SENECA 0441 — C & H Supply Company, 2723 First Ave., South
- ATLANTIC 0871 — Interstate Machinery & Supply Co., 1006 Douglas
- BEACON 2137 — C & H Supply Company, 1316 S. W. Washington
- VICTOR 1310 — 210 West 8th St.
- NEWSTEAD 3110 — 4030 Chouteau Ave.
- TABOR 0444 — A. G. Bown, Colorado Bldg.
- 4-2379 — Cummings & Company, 151 N. Rock Island
- GARFIELD 0817 — Walter R. Carr Co., 934 Howard St.
- 5-1111 — Industrial Equipment Co., P.O. Box 721, 18th & Boston
- WEBSTER 3-1211 — 5670 Wilshire Blvd.
- KIMBALL 0181 — Ducommun Metals & Supply Co., 4890 S. Alameda St.
- 3-4484 — Oliver H. Van Horn Co., Inc. of Tex., 1017 Main St.
- 3-2905 — Martin Building
- 4-5652 — Safety Engineering & Sup. Co., Inc., 407 North 24th St.
- 2-2173 — Oliver H. Van Horn Co., Inc., Spring & Fannin Streets
- C4-6551 — Oliver H. Van Horn Co., Inc. of Tex., Franklin Ave., Corner Austin St.
- RAYMOND 9571 — Van Horn & Son., Inc., 1742 S. Charles Ave.

SEATTLE · PORTLAND · SAN FRANCISCO · LOS ANGELES · DENVER · OMAHA · KANSAS CITY · WICHITA · TULSA · MINNEAPOLIS · MILWAUKEE · NORTH CHICAGO · ROCKFORD · CHICAGO · INDIANAPOLIS · ST. LOUIS · FORT WORTH · SHREVEPORT · HOUSTON · NEW ORLEANS · BIRMINGHAM · CHATTANOOGA · KNOXVILLE · ATLANTA · MACON · CHARLOTTE · LANSING · DETROIT · FT WAYNE · CINCINNATI · BUFFALO · CLEVELAND · PITTSBURGH · ORISKANY · SYRACUSE · READING · PHILADELPHIA · BALTIMORE · BOSTON · HARTFORD · NEW YORK

LEGEND:
- ● Branch Offices
- ○ Distributors
- ★ Main Office

- 5-2816 — Bank of Lansing Bldg.
- TEMPLE 1-2367 — 5533 Woodward Ave.
- ANTHONY 3268 — Citizens Trust Bldg.
- WASHINGTON 7716 — 209 Crosby Bldg.
- UTICA 6-1171 — Roux Wire Die Works, Inc.
- ELIOT 1949 — 238 Main St., Cambridge 42, Mass.
- 3-0334 — State Tower Bldg.
- 32-5197 — 967 Farmington Ave., West Hartford 7, Conn.
- WORTH 2-3923 — 50 Church St.
- TRINITY 8782 — 125 Coulter Ave., Ardmore, Pa.
- READING 2-5423 — 19 North 25th St.
- CALVERT 2196 — Baltimore Trust Bldg.
- ATLANTIC 9699 — Fulton Bldg.
- CHERRY 0277 — Auditorium Bldg.
- 4-1614 — Matthews Morse Sales Co., 909 So. Mint St.
- JEFFERSON 6688 — P.O. Box 127, (Norwood)
- RILEY 3946 — 15 E. Washington St.
- 4-2881 — Knoxville Tool & Equipment Co., 818 McGhee St.
- MACON 171 — Macon Supply Co., 25 Fifth St.
- WALNUT 2255 — Pye-Barker Supply Co., 244 Forsyth St., S.W.
- 6-8197 — Rogers-Bailey Supply Co., 1146 Market St.

Tantalum-Tungsten CARBIDE TOOLS & DIES

"The World's Finest Carbide"

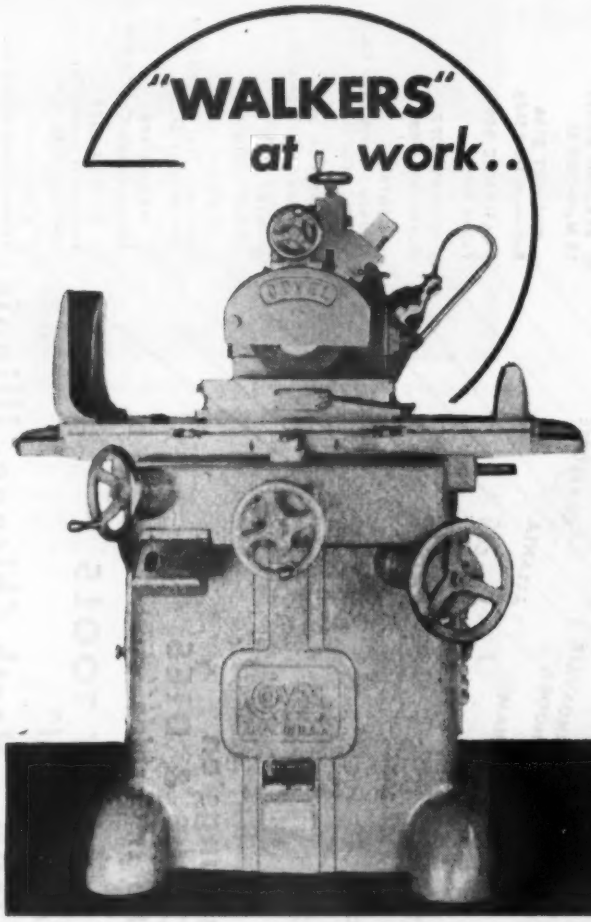
• • •

TANTUNG CAST ALLOY TOOLS

"The Miracle Tool Metal"

4522

VASCOLOY-RAMET CORPORATION • North Chicago, Illinois



One of a series of advertisements showing well-known makes of machine tools equipped with Walker Magnetic Chucks.

Delicate Surface Grindi Operations are Protected wi WALKER MAGNETIC CHUC

Present-day production and tool room requirements impose difficult demands on surface grinders. Higher speeds in table travel and harder wheels mean that work holding must be absolutely accurate and dependable.

The use of the "WALKER" on the Covel Surface Grinder is assurance that the delicate operations involved in surface grinding will be accomplished with minimum effort, maximum precision and finest finish. It will be to your advantage to discuss your surface grinding problems with your machine tool builder and with "WALKER."

New developments by "WALKER" include improved Electro-Magnetic Chucks of longitudinal and bar pole design and Permanent Magnetic Chucks in plain and swivel types.

Full information on WALKER MAGNETIC CHUCKS is available promptly on request.

O. S. WALKER CO., INC.
100 ROCKDALE ST.
WORCESTER 6, MASS.

NEW! *Another*
GRAND *Speed* CLAMP

- EXTRA DEEP THROAT
- QUICK SETTING
- INSTANT TRIGGER RELEASE
- SPATTER-PROOFED

Here Is the Extra-Deep Throated Speed Clamp You Have Been Asking for

GRAND A.S.L. DEEP THROAT CLAMPS

Position instantly with push on combination ratchet screw (no waste motion running down screw) and tighten with turn of vise-type handle. Holds work with firm tension grip on any surface, even slanting or irregular; ball and socket swivel (replaceable) prevents shifting or creeping.

Release instantly—simply loosen handle and push on trigger—clamp lifts free, ready for application to other work.

Made of Alloy-Steel of Forged Clamp Capacity.

SPATTER-PROOFED—All working parts are COPPER PLATED against welding spatter.

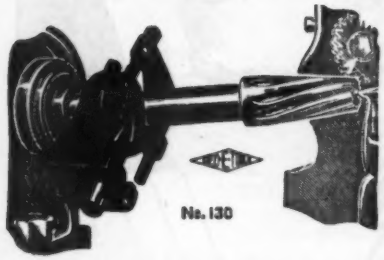
Write for Catalog on Complete Line of GRAND Speed Clamps for every kind of work.

EXTRA DEEP THROATS

	Opening	Throat
No. 4—ASL	4¾"	4¼"
No. 6—ASL	6¾"	4¾"
No. 8—ASL	8¾"	6

PROMPT SHIPMENT

GRAND SPECIALTIES COMPANY
3100 Grand Avenue CHICAGO 22, ILL.



ACCURATE

on straight, spiral or taper work because the ball and socket sliding member eliminates all lost motion. Made in two sizes with #10, #11 and #12 B&S shank; also with #40 spindle.

Write for Catalog A44

The READY TOOL CO.
IRANISTAN & R. R. AVENUES
BRIDGEPORT . . . . . CONN.

The Standard Man

HIS business is to help solve tough problems in drilling, reaming, tapping and milling.

He is qualified and capable. This Company's 64 years of experience in manufacturing drills, reamers, taps, dies, milling cutters and special tools for America's most exacting users in every industry, is his background.

Whether he be an engineer, foreman, workman, executive, or traveling representative of this Company, he is interested in but one thing—providing the tools that will do the best, most economical job for you.

Usually he can select from our stock of thousands of items the best tools for your particular job.

The Standard Man is a good man to know because he knows his business.

If your metal cutting job is unusual or just routine, his service and advice is at your disposal—no obligation, of course. For prompt attention to your requirements, write or call

"Red Shield" Brand
TWIST DRILLS
REAMERS
MILLING CUTTERS
TAPS · DIES
SPECIAL TOOLS

THE STANDARD TOOL CO.

CLEVELAND

NEW YORK STORE
94 READE STREET

DETROIT STORE
6553 HAMILTON AVE.

CHICAGO STORE
552 W. WASHINGTON BLVD.

FOR UNIFORM OPERATION

STANDARDIZE

STANDARD Shield Brand Tools are made in a completely modern factory, equipped with the most efficient machines for manufacture and testing.

Workmen are highly trained for each operation, with skills acquired by years of experience.

Inspection and testing is accurate, reliable and thorough.

The management of our Company is interested in only one thing—producing the best tools that can be made for each particular job.

Results—Standard Shield Brand Tools are uniform in construction, performance and in low service cost.

Many manufacturers have Standardized their small tool requirements by specifying and using Shield Brand Drills, Reamers, Taps, Dies, Milling Cutters and Small Tools. They have thus secured uniform, economical results in metal cutting operations.

You may likewise find it profitable to Standardize on Standard Shield Brand Tools. Leading mill supply houses from coast to coast supply these fine tools.

THE STANDARD TOOL CO.

CLEVELAND

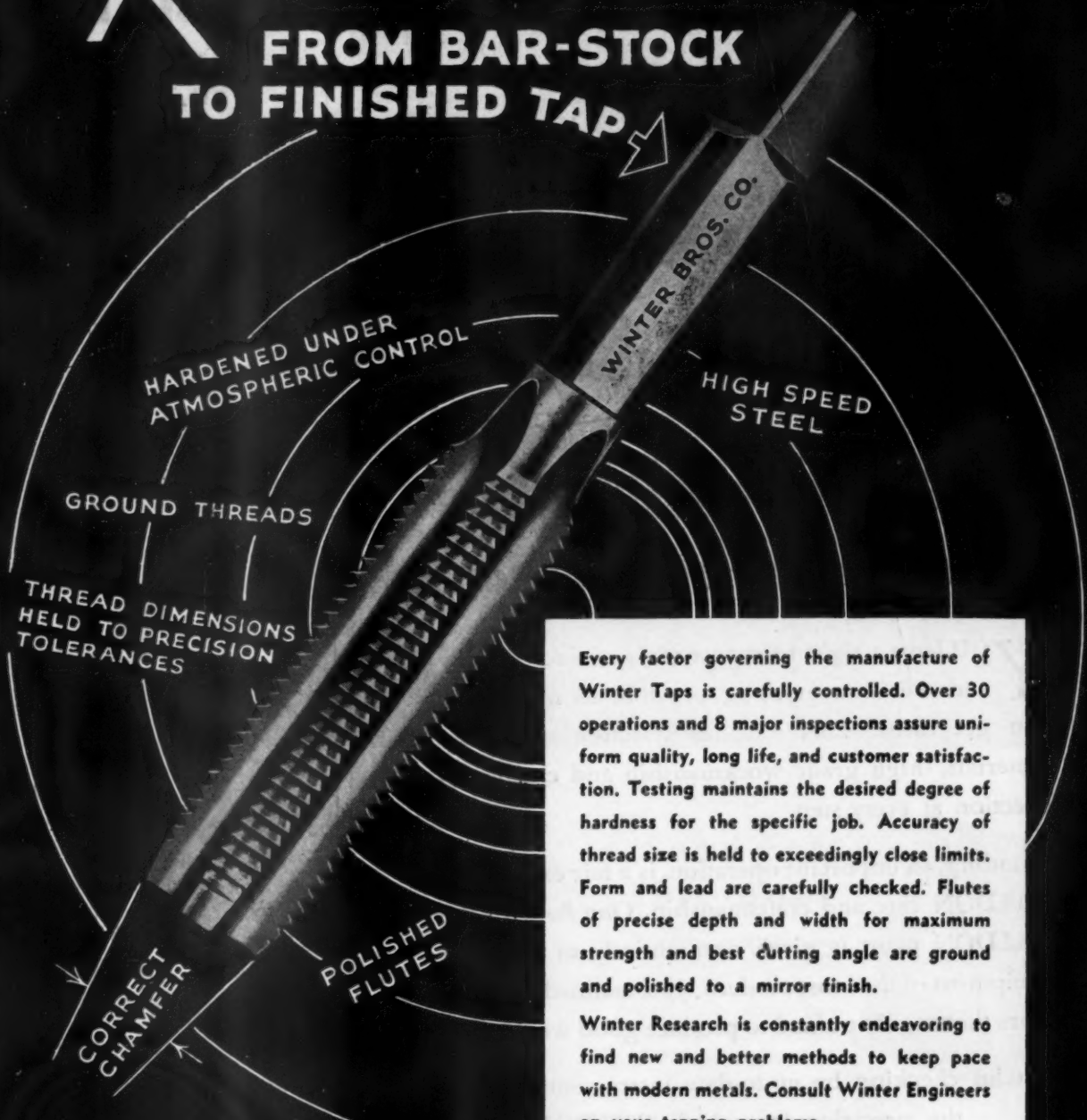
NEW YORK STORE
94 READE STREET

DETROIT STORE
6553 HAMILTON AVE.

CHICAGO STORE
332 W. WASHINGTON BLVD.

RIGID CONTROL

FROM BAR-STOCK TO FINISHED TAP



Every factor governing the manufacture of Winter Taps is carefully controlled. Over 30 operations and 8 major inspections assure uniform quality, long life, and customer satisfaction. Testing maintains the desired degree of hardness for the specific job. Accuracy of thread size is held to exceedingly close limits. Form and lead are carefully checked. Flutes of precise depth and width for maximum strength and best cutting angle are ground and polished to a mirror finish.

Winter Research is constantly endeavoring to find new and better methods to keep pace with modern metals. Consult Winter Engineers on your tapping problems.

A DIVISION OF NATIONAL TWIST DRILL & TOOL CO.
ROCHESTER, MICHIGAN

Winter Brothers

COMPANY
BRANCH STORES

Wrentham, Massachusetts, U.S.A.
SAN FRANCISCO CALIFORNIA · CHICAGO ILLINOIS · DETROIT MICHIGAN

YESTERDAY'S PIONEER · · · TODAY'S LEADER

ONE SECTION OF
GRINDING
DEPARTMENT

CAREFUL GRINDING

INSURES WELDON TOOL PRECISION

YOU have a right to expect tools of finest quality and we do everything possible to make sure you get them. This includes selection of quality materials, high grade workmanship and careful inspection at every step.

Grinding, an important operation, is a fair example of WELDON care and craftsmanship. One floor of the WELDON plant is given over entirely to grinding equipment of the most modern type, manned by operators thoroughly trained to produce good work.

Careful checking by up-to-date instruments insures the precision for which WELDON tools are noted. Insist on *WELDON Tools for Well Done jobs.*

Write for Catalog 8-B

THE WELDON TOOL CO. *Cleveland 4, Ohio*

3000 WOODHILL ROAD

IMMEDIATE DELIVERY

No. 1 to 60 New High Speed Long Length

DRILLS

No. by Gage	*Length*	*Our Price Net Each*
1 to 10	6¼	$ .75
11 to 20	5¾	.75
21 to 30	5⅜	.75
31 to 40	5¼	.75
41 to 50	4½	.75
51 to 60	4¼	.75

If you buy 60 drills or more — 20% discount

VICTOR
MACHINERY EXCHANGE
INC.
251 CENTER STREET
NEW YORK N. Y.

YOU'LL SAVE FOUR WAYS WITH THESE

'TRU-LINE' *Diamond Tools*

'TRU-LINE multiple diamond tools require no turning. Machine down-time is reduced, production increased.

Diamonds are set in overlapping rows, providing a continuous and efficient cutting surface for the life of the tool—without changing, re-setting or adjusting.

Matrix forms a chemical bond with the diamonds, holding them securely until entirely used. Thin blade dissipates heat, safeguards the diamonds.

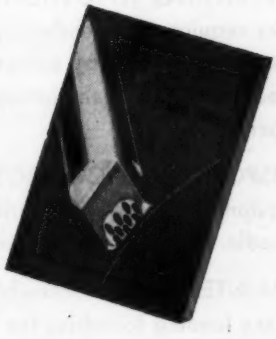
The effective use of smaller, carefully selected, high quality diamonds permits much lower diamond tool costs, yet assures efficient cutting.

TRU-LINE multiple diamond tools have consistently demonstrated their ability to deliver these four kinds of savings under all conditions of use on vital war material where speed, accuracy and finish are important factors. On many jobs they have completely replaced ordinary diamond tools.

There is a TRU-LINE tool for every type of straight, profile or step-dressing operation.

Send For This Book

It gives complete information on TRU-LINE tools, shows how they save time and money. Your copy gladly sent on request.



WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue
Detroit 6 • Michigan

575 Langlois Avenue
Windsor, Ont. • Canada

We Invite Point-by-Point Comparison

with any other type of dust collecting equipment

Schneible 9600 c.f.m. dust and fume collector with conveyor type dewaterer for mechanical discharge of sludge in the Experimental Foundry of the American Brake Shoe Company; one of many Schneible installations in the plants of various divisions of this company.

When all factors are taken into consideration in selecting dust control equipment, Schneible is invariably the choice.

ENGINEERING—Schneible standard units are adaptable to practically every dust and fume condition. Schneible engineers survey the plant thoroughly and make authoritative recommendations including proper ducting and "Uni-Flo" hoods, where desirable.

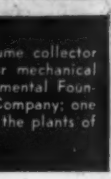
THOROUGH DUST REMOVAL—The Schneible wet method removes a higher percentage of dust from the collected air, including minus-micron float dust, which is the most difficult to control.

OPERATING ATTENTION—Schneible Multi-Wash Collectors require no attendance other than to switch on and off. There are no filters, screens or bags to require periodical cleaning. The human element is not involved in their efficient operation.

DISPOSAL OF COLLECTED SOLIDS—With Schneible equipment, there is no bothersome accumulation of dust to handle. The collected matter, as sludge, permits easy disposal.

MAINTENANCE—Schneible systems have been chosen by many leading foundries for their low maintenance. They contain no parts which break, burn, clog or rapidly wear.

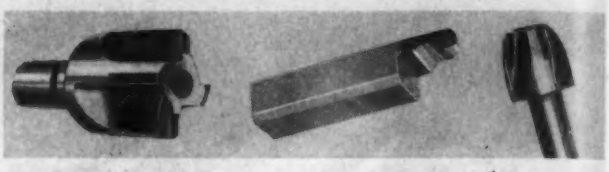
COST—Schneible equipment is lowest in ultimate cost because it functions continuously for long periods with minimum operating and maintenance expense. The water employed as the collecting medium is used over and over.



CLAUDE B. SCHNEIBLE CO.
2827 Twenty-Fifth St., Detroit 16, Mich.
Engineering Representatives in Principal Cities

SCHNEIBLE

SAM:—BOSS—I NEED HELP!
BOSS:—HOW COME?
SAM:—CAN'T KEEP UP WITH THE CHIPS—GUESS IT'S THAT A.C.E. CARBIDE CUTTER REMOVES THE STOCK FASTER THAN I CAN.



Sam is right—the A.C.E. carbide cutter turns out the work so fast that the chips do pile up. Carbide cutters certainly speed up the cutting. Better look into this—you may be able to speed up your production materially with A.C.E. carbide tipped cutters made specially to suit your requirements.

AMERICAN CUTTER
AND ENGINEERING CORPORATION
31745 MOUND ROAD • WARREN, MICH.

BUY MORE BONDS—HELP CUT DOWN THE JAPS

A.C.E. SPECIAL CUTTING TOOLS
HI-SPEED OR CARBIDE-TIPPED

SIGOURNEY M-100

PRECISION MADE FOR PRECISION RESULTS

The Sigourney M-100 Bench Drilling Machine provides the rigid, accurate construction that means maintained precision over a long service life.

Completely enclosed for operator safety . . . sealed ball bearings throughout . . . hardened and ground spindles . . . standard speed range from 4000 to 10,000 RPM, other ranges available . . . manufactured in models from 1 to 6 spindles.

Send for Illustrated Bulletin

THE SIGOURNEY TOOL CO.
Hartford 6, Conn.

Sole Sales Agents
PRATT & WHITNEY
Division Niles-Bement-Pond Co. West Hartford, Connecticut

A full line to meet your Socket Wrench needs!

Hex or square . . . standard or special nuts . . . power or hand driven . . . it's all the same to Apex.

Apex Socket Wrenches are accurately machined from electric furnace high carbon alloy bars—cold broached and carefully heat treated. They are built to withstand tremendous strains and shocks.

We're tooled up for speed and flexibility. Should you require a special wrench, send us sketch, blue print or description, and we will quote you promptly on tools built to meet your special needs

The great new APEX SOCKET WRENCH CATALOG illustrates our entire line of standard wrenches, giving dimensions, prices and everything you want to know. A copy is yours for the asking. Write for it on your company letterhead.

APEX Socket Wrenches

THE APEX MACHINE & TOOL COMPANY • DAYTON 2, OHIO

RADIAL DRILLING . . .
With the HARTFORD SUPER-SPACER

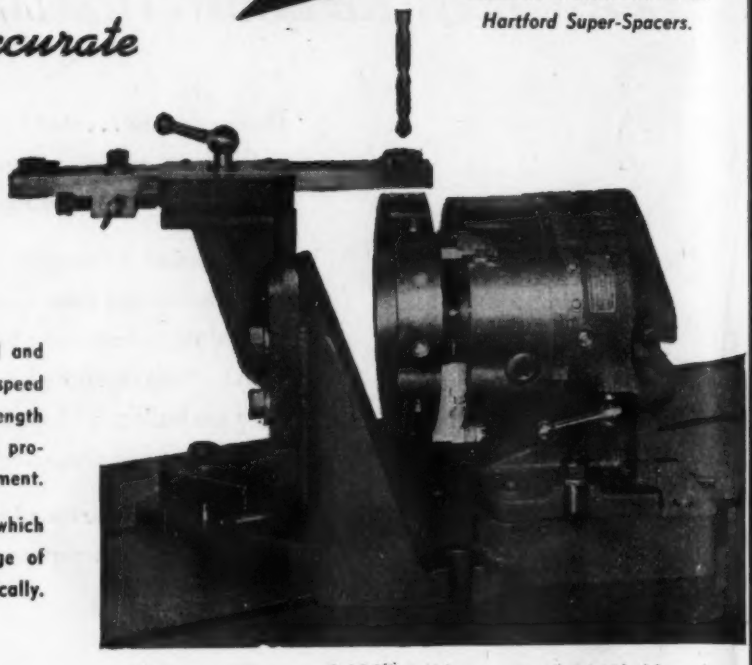
Convenient · Fast · Accurate

The use of the Hartford Super-Spacer . . . for indexing operations on drilling, milling and jig boring machines as well as planers, shapers and slotters . . . has been a very important factor in speeding up both production and tool room operations. Indexing is fast, convenient, accurate and positive, with all possibility of error removed through the use of mask plates.

Applied to radial drilling, the Super-Spacer assures a tried and proved means of handling indexing operations with utmost speed and precision. Time is saved in set-up . . . variations in length and diameter are easily handled and ample adjustment is provided for all jobs that come within the range of the attachment.

It will be to your advantage to investigate the many uses to which the Hartford Super-Spacer may be put and the wide range of indexing operations it will handle effectively and economically.

Write for further information.



Hartford Super-Spacer with Radial Drilling Attachment secured to base. This attachment is available for all Hartford Super-Spacers.

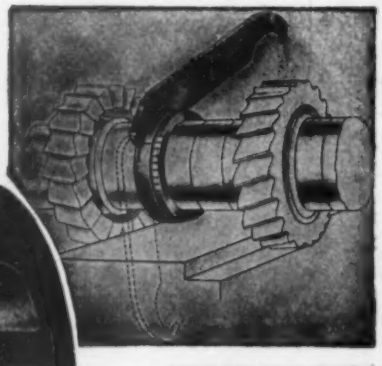
THE HARTFORD SPECIAL MACHINERY COMPANY, Hartford 5, Conn.

SAVE TIME ON YOUR GANG MILLING SET-UPS

You are assured FAST—ACCURATE spacing on all side milling cutters and gang milling set-ups with

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

Just loosen cutter arbor nut and make plus or minus adjustment with handy wrench as shown.



"DAYTON ROGERS" ADJUSTABLE SPACING COLLARS are graduated in thousandths, with plus or minus markings as illustrated. A .0005 adjustment can easily be made by visual calibration. These collars are made in 12 standard sizes from ⅞" to 2".

Write for illustrated bulletin S120-1

DAYTON ROGERS MFG. CO.
2835 12th Ave. S. Minneapolis, Minn.

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

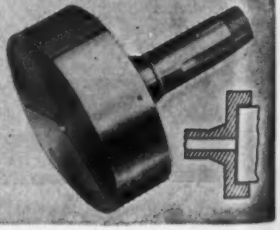
For 10" ATLAS & LOGAN, SOUTH BEND, SHELDON, CRAFTSMAN, POWR-KRAFT, CLAUSING and other important lathes.

IMMEDIATE DELIVERY FROM STOCK

The Precision name on a collet is your unconditional guarantee of accuracy in machining, hardening and grinding. Make sure then to specify Precision when ordering from your dealer. Literature on request.

- MODEL 3AT: For 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft.
- MODEL 3C: For 8" & 9" South Bend, Clausing, Hardinge No. 3, 10" LeBlond, etc.
- MODEL 1A: For 8" & 9" South Bend.
- MODEL 5C: For 9", 10", 16", 18" South Bend, 1" capacity Sheldon, Schauer, Sebastian, etc.
- MODEL 4C: For 14½" South Bend, ¾" capacity Sheldon, Hardinge No. 4, Elgin, etc.
- MODEL 480: For Logan Screw Machine, Turret Lathe and attachments; Warner & Swasey No. 1, etc.
- BREN Collet: For Handwheel & Lever-Type Speedichuk.

KLUTCH - KOLLET (Step Chuck) for chucking work to 2¾" diameter with collet accuracy. Head unhardened for easy boring. Fits 3AT, 3C, 1A adapters only. List unbored $7.50 each.

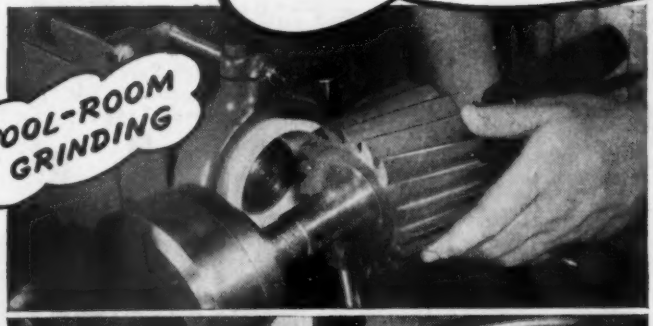


• 5C KLUTCH-KOLLET NOW READY. List unbored $10.50.

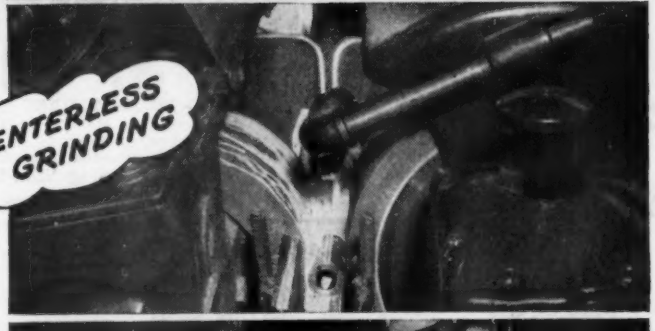
GENERAL DIE AND STAMPING COMPANY • 262 Mott St., New York 12, N. Y.

THERE IS A PRODUCT BY "CARBORUNDUM" FOR EVERY ABRASIVE APPLICATION!

TOOL-ROOM GRINDING

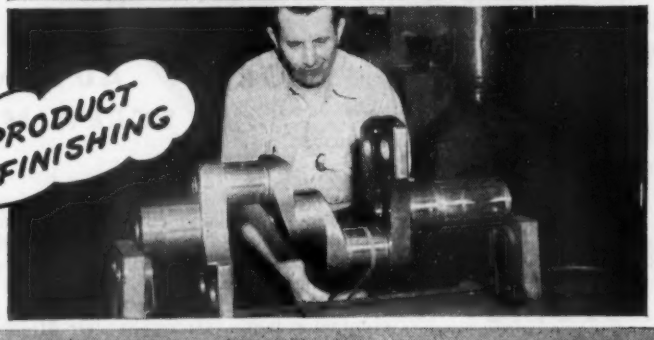


CENTERLESS GRINDING



CENTER-TYPE GRINDING

PRODUCT FINISHING



YEARS of skilled research and experience by "CARBORUNDUM" Abrasive Engineers have led to the finest, most complete line of abrasive products on the market — abrasives that give you the maximum in efficient production at the lowest possible cost. Consult our nearest office to obtain the right abrasive product by "CARBORUNDUM" to meet your particular requirements.

The Carborundum Company,
Niagara Falls, New York.

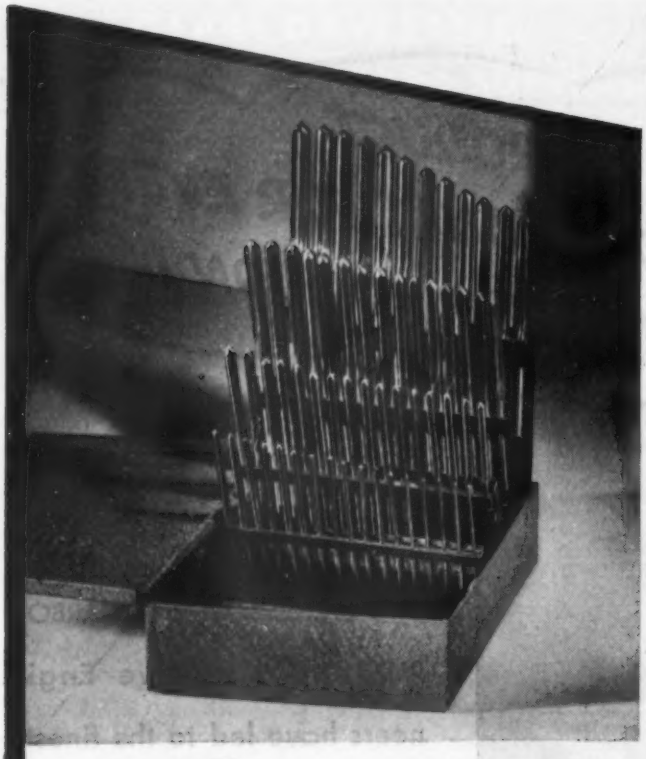
THERE IS A PRODUCT BY

CARBORUNDUM

TRADE MARK

FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)



A Standful of Better Production

This matched set of sixty L & I Ground Flute Reamers in Wire Gage sizes is only part of the L & I Line of Better Reamers.

They're better, because L & I specializes in ground flute reamers — ground *after* the solid bar is heat-treated and uniformly hardened. This gives a perfect cutting edge that stands up far longer than ordinary milled flute reamers.

Because we're "Specialists in Small Reamers," we ship from stock Machine Reamers by 64's from 1/16" to 5/16" and Wire Gage sizes 1 through 60, as well as Taper Pin Reamers from 7/0 to #4.

Place a trial order today and join the long list of leaders who are cutting costs and improving work quality with L & I Ground Flute Reamers.

LAVALLEE & IDE, INC.

CHICOPEE, MASSACHUSETTS

2

L&I GROUND FLUTE REAMERS

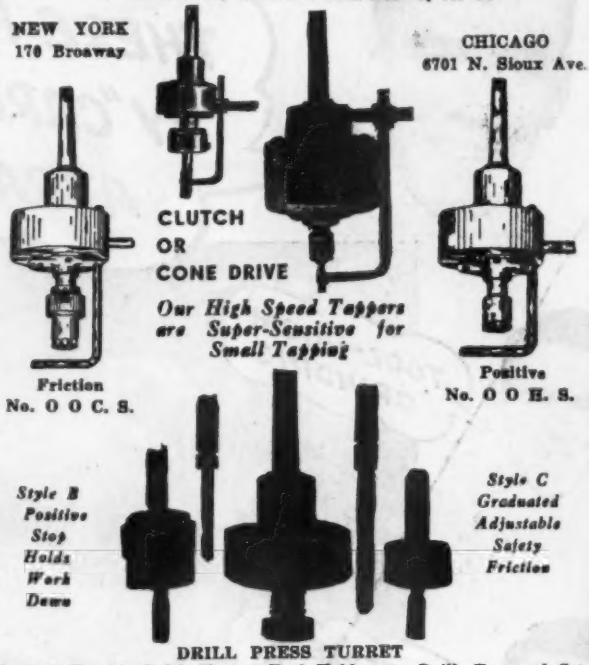
ERRINGTON MECHANICAL LABORATORY

TAPPING CHUCKS

STAPLETON, STATEN ISLAND 4, N. Y.

NEW YORK
170 Broadway

CHICAGO
6701 N. Sioux Ave.



Our High Speed Tappers are Super-Sensitive for Small Tapping

Friction
No. 0 0 C. S.

Positive
No. 0 0 H. S.

Style B Positive Stop Holds Work Down

Style C Graduated Adjustable Safety Friction

DRILL PRESS TURRET

Style D-E with Quick-Change Tool Holders to Drill, Tap and Set studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustment in each tap-holder. If required.

Also, Opening Die-Heads; Opening Stud-Setters; Friction Screw-Drivers and Nut-Setters, etc.

GREEN FULL-FLOATING REAMER HOLDER

FOR AUTOMATIC SCREW MACHINES

SUCCESSFUL new float action, based on synthetic rubber, and employing no balls, rollers, springs, friction devices, or similar moving parts, gives a free but controllable aligning movement on the reamer so that it *will not cramp or cause bell-mouth.* A simple adjustment centers the reamer and eliminates hang. Green Reamer Holders are fast gaining wide and enthusiastic acceptance on all popular makes of machines. They are the answer to your reaming troubles!

Write for Descriptive Bulletin

GREEN MANUFACTURING CO.

650 S. WYMAN ST., ROCKFORD, ILLINOIS

Why AIR tools are Better...

1. Air tools are much smaller than comparable tools otherwise powered. This means:
   - a. Less weight
   - b. Easier handling
   - c. Less operator fatigue
   - d. More work per man per shift

2. Air tools cannot be harmed by overloading. This means:
   - a. No parts will burn out
   - b. Longer life; less maintenance

3. Air tools are safe. This means:
   - a. No danger of fire, explosion or injury to worker
   - b. They may be used around hazardous materials

4. Air tools start and stop instantaneously. This means:
   - a. Maximum power reached more quickly

5. Air tools are the only successful tools for reciprocating operations. This means:
   - a. For riveting, ramming, etc., air tools are most effcient.

● And CLECO AIR TOOLS are *better* because our manufacturing methods—machining, heat-treating, inspection—are unexcelled. We have perfected our production processes through more than 50 years of making the best pneumatic tools. Write for 150-page, illustrated Catalog 44.

THE CLEVELAND PNEUMATIC TOOL CO.

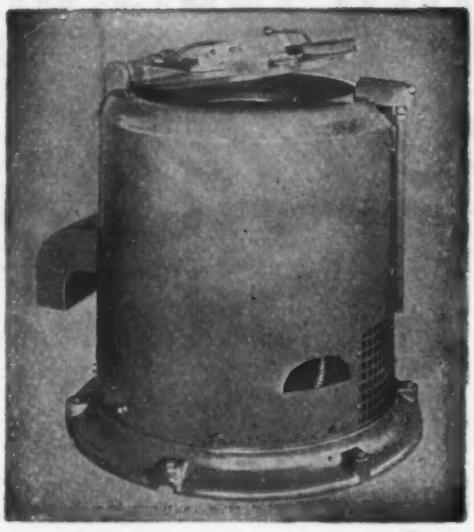
BRANCH OFFICES IN PRINCIPAL CITIES

3761 EAST 77th STREET • CLEVELAND 5, OHIO

CLECO AIR TOOLS

AIR HOSE
AIR VALVES
CALKING TOOLS
CHIPPERS
CORE BREAKERS
COUPLINGS
DRILLS
GRINDERS
NUT SETTERS
RAMMERS
REAMERS
RIVET BUSTERS
RIVETERS
SANDERS
SCALERS
SCREW DRIVERS
SUMP PUMPS
WOOD BORERS

DRY SMALL PARTS QUICKLY and ECONOMICALLY with BARRETT CYCLONE CENTRIFUGAL DRYERS



The Barrett Centrifugal Dryer — efficient, self-contained, and compact is built in several sizes.

• The Barrett Parts Drying Process centers around a method of creating a guarded cyclone.

In operation, parts to be dried are placed in a well ventilated motor driven rotating basket. Free liquid is immediately thrown off by centrifugal force and any moisture remaining on parts is absorbed in the shortest possible time by the large volume of expanded air continually forced over and through the contents. Provision is made for heating and expanding, also boosting the flow of incoming air to assure faster absorption of moisture. With the large exhauster provided, heated air is not always required.

Direction of basket rotation can be quickly reversed which will change position of the load and accelerate drying. Baskets are available in shapes which experience has shown to be most effective for handling various classes of work.

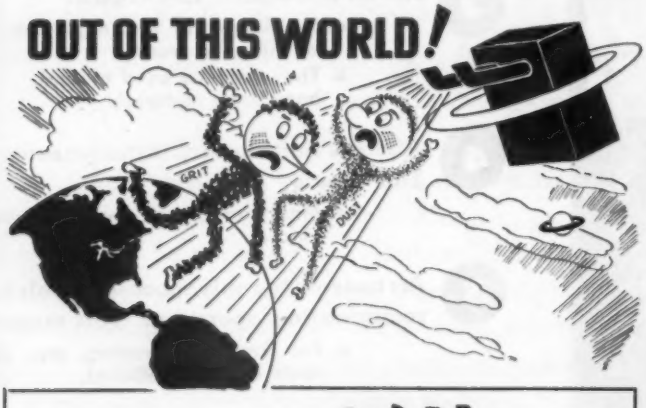
It will pay to investigate the advantages offered by Barrett Centrifugal Dryers on your work.

Full Details of the Barrett Cyclone Dryer Sent Promptly on Request.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

OUT OF THIS WORLD!



The way the AIR-MASTER sucks dust and grit from the whirling wheels of buffers and grinders is amazing. Eliminates these tiny but deadly destroyers of health and machinery right at the moment they fly off the wheels. Keeps the air clean! This means healthful working conditions for employees! Keeps them on the job! Keeps expensive machinery on the job by protecting delicate bearings and moving parts. Install the AIR-MASTER.

The AIR-MASTER is fully self-contained—efficient, rugged, dependable. A size for every grinder and buffer. Write today for full details.

NOW AVAILABLE: Two, three and five H.P. grinders and buffers on AA-3 priority or better. Write for catalog.

The Cincinnati

ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS

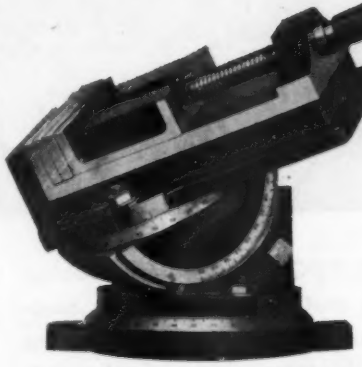
The Cincinnati Electrical Tool Co. 2615-15 Madison Rd.

DIVISION OF THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI, OHIO

SAVE TIME ON INTRICATE

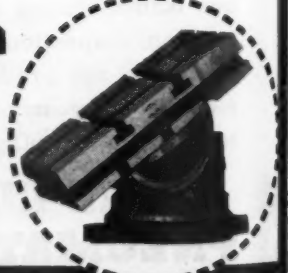
★ ANGULAR SET-UPS ★

MULTI-SWIVEL VISE



Fully universal . . . three swivels simplify the setting of compound angles.

Parts interchangeable . . . can be used as a plain flanged vise, a swivel vise or a multi-swivel vise.



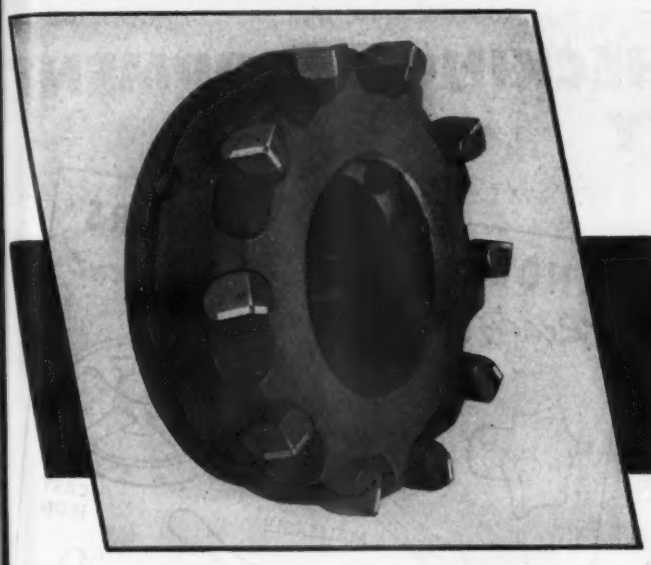
The Platen greatly increases the capacity of the unit. Vise and Platen are interchangeable.

NO PRIORITY NECESSARY

DISTRIBUTORS! Inquire about new exclusive franchise.

MASTER TOOL CO.

161 HIGH STREET • BOSTON MASS.



NEGATIVE RAKE

An outstanding production method that is accomplished perfectly with Lovejoy Milling Cutters.

Super-speed milling with negative rake blade angle is a new, unconventional milling method that is producing outstanding results on war production, and promises a new low in costs when peacetime returns.

Lovejoy Milling Cutters, with positive-locking, negative rake blades have proved extremely successful—producing more work, with longer blade life, with finer finish. Lovejoy cutter bodies are bored to the correct negative rake yet retain standard Lovejoy features, such as hardened alloy steel body and easily replaceable positive locking blades. The carbide tipped blades can be *used up* on a Lovejoy and they are interchangeable in any mill of the same diameter, and over a wide range of sizes. If you wish, you can leave out every other blade (or use only one or two blades) in any Lovejoy Cutter without sacrificing housing strength.

Write to Lovejoy for performance data on negative rake milling. An up-to-date file on this method is kept for your benefit.

Please send me my free copy of "Lovejoy Modern Metal Cutting Tools."

NAME_____ TITLE_____

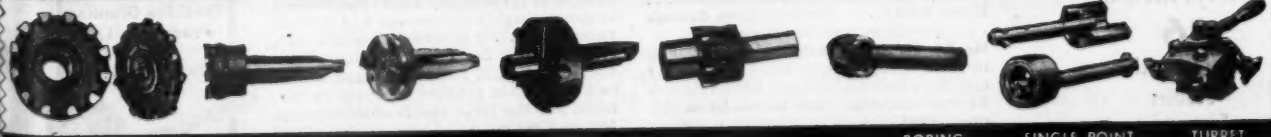
COMPANY _____

STREET _____

CITY_____ STATE_____

T-1

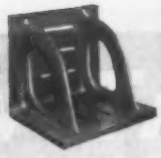
Lovejoy TOOL COMPANY, Inc., SPRINGFIELD, VT., U.S.A.



MILLING CUTTERS · BORING HEADS · ARBORS · SPOT FACING TOOLS · COUNTERBORES · BORING BARS · SINGLE POINT TOOLS · TURRET TOOL POSTS

MEASURING AND CHECKING EQUIPMENT OF HIGHEST QUALITY

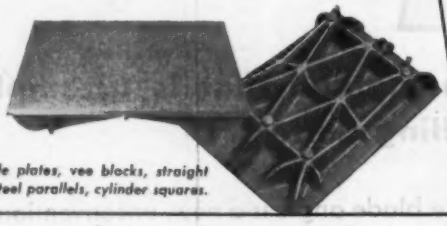
SLOTTED ANGLES
In 19 sizes, ranging from 4 x 9 x 5 and up—in both scraped and ground finish.



BOX PARALLELS
In 15 sizes, ranging from 3 x 4 x 12 and up—in ground finish.

UNIVERSAL ANGLES
In 10 sizes, ranging from 4 x 3¼ x 5 and up—in ground finish.
Special sizes made to order.

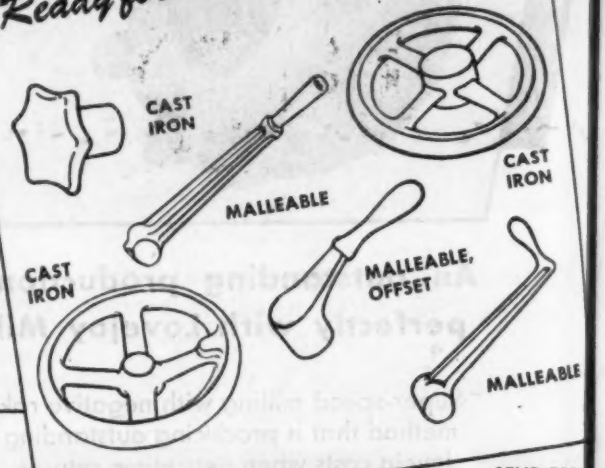
SURFACE PLATES
Over 50 sizes, ranging from 7 x 7½ to 96 x 192.



Also, measuring angles, angle plates, vee blocks, straight edges, boring mill parallels, steel parallels, cylinder squares.

We rescrape surface plates and repair angles, cubes, etc.

KNOBS WHEELS LEVERS
Ready for immediate shipment



SEND FOR COMPLETE CATALOG

MACHINE PRODUCTS CORPORATION
6771 E. McNICHOLS ROAD
DETROIT 12, MICHIGAN

STANDARD US HEADS SINCE 1915

All Types of Fixed Center

DRILLING TAPPING & BORING HEADS

Four Spindle Head. All Spindles Adjustable for equally spaced holes.

FIVE TYPES, 56 SIZES, ADJUSTABLE DRILL HEADS

UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO

Clean Up Dust, Dirt and Litter—Protect Valuable Equipment—Promote Efficiency — with the Powerful, Portable, One-Man

TORNADO VACUUM CLEANER

BEFORE dust and dirt damage valuable motors and machinery, clean up floors, walls, ceilings and overhead beams and pipes with TORNADO. Powerful suction insures quick cleanup. 1 h.p. G. E. motor, 49" water-lift, 175 c.f.m. Attachments for cleaning everything.

Request details and FREE TRIAL Offer

BREUER ELECTRIC MFG. CO. 5084 N. Ravenswood Ave. CHICAGO 40, ILL.

Actual Size Photo
3 Carat Size—Common
⅛" Shank—$36.00 ea.

DIAMONDS *for Production*

RE-SET-ABLE • BIG-HED-NIB
(Trade Marks Registered)

LOC-KEY-SET
by Patented Process
U. S. Pat. 2,351,741

16
Factory Branches
Jobbers Everywhere

● **RE-SET-ABLE** adds to life of your diamond . . . More work per carat. Exclusive patented setting is tender to the diamond . . . Holds firmly . . . Protects from damage . . . Guards against breakage.

No. 24 CN RE-SET-ABLES are now selling in 100 lots. Ask for easy No. 4 Catalog and Grinder's Instruction Card. Shows sizes to fit your machines. Tools backed by service unequalled.

All diamonds are LOC-KEY-SET for immediate shipment . . . Tools numbered in units of ½ carat (No. 1 size) and lettered to denote quality of diamond and style of mounting . . . 3 grades — Common (C), Medium (M), Select (S). (24-hour resetting service $1.00 postpaid.) Bigger stones in C grade are genuine economy in diamond use. For large wheels we recommend No. 60-CN.

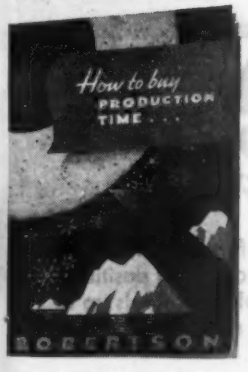
Equip Now with "RE-SET-ABLE" Diamond Tools on Your Precision Grinding Production Line

DIAMOND TOOL COMPANY, Not Inc. SHELDON M. BOOTH, Pres. 938 E. 41st Street CHICAGO 15, Ill.

IT'S A ROBERTSON COOL-CUT

The foreman of the grinding department of a big, ordnance plant stared at the Robertson sales engineer in amazement. The foreman had been trying to take a .0001″ cut off Airdie steel, Rockwell 68. The wheel he was using was getting nowhere. The Robertson sales engineer put on a Cool-Cut wheel and said, "Now don't *play* with it—take off .020″ depth, with .020″ cross-feed."

He tried it, and it worked! The Cool-Cut wheel took the metal off without heating the work and with no measurable wheel-loss. Chip-clearance of this revolutionary new wheel made it possible. The foreman said he'd never seen anything like it in his 45 years of experience. Now he knows that the Robertson sales engineer knew what he was talking about and that Cool-Cut wheels are precision-built for the *toughest* work. Fifty years of experience in the operation of high-temperature furnaces gives Robertson the know-how that makes them one of the most progressive grinding wheel manufacturers today, and assures them an increasingly important place in the field of industrial grinding.

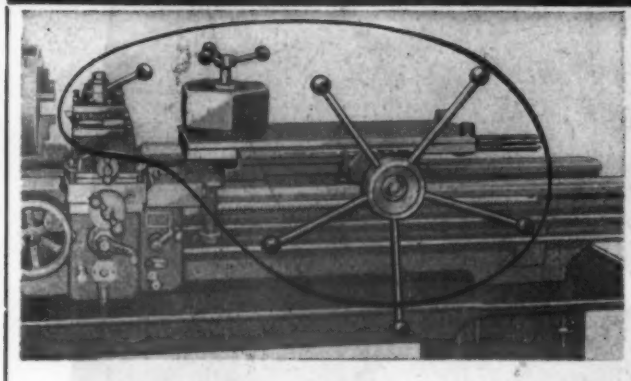


FREE—*Write for this new booklet,* "How to Buy Production-Time." *It contains facts about grinding wheels you never knew before!*

ROBERTSON MANUFACTURING COMPANY • **TRENTON 5, NEW JERSEY**

VITRIFIED-BONDED GRINDING WHEELS • MOUNTED WHEELS • SEGMENTS

LYNN Equips Your Lathes for Immediate Turret Work



Put your idle or unproductive lathes back into profitable production *at once.* No delays, no tedious overhauling, no large capital investment . . . LYNN turret units, mounted on your *present* lathes, provide the equivalent of NEW TURRET LATHES in capacity, accuracy, speed and range of work.

Reconditions Turret Lathes

Your worn or inaccurate turret lathes and screw machines completely re-conditioned without leaving your plant or interrupting production. Simply use LYNN units as replacements. Illustration above shows a turret lathe that has been re-conditioned with LYNN equipment, including Self-Indexing Bed Turret. Quick mounting and perfect alignment assured by *factory machining of bed turret bases for your particular make of lathe.*

CONVERTS ENGINE LATHES FOR SCREW MACHINE AND TURRET LATHE WORK

The practical, economical solution for short-run production. Easily, quickly mounted, LYNN turret units enable your lathes to handle multiple operations comparable to those done on turret lathes and screw machines. LYNN manufactures a complete line of Self-Indexing Bed Turrets—in addition to tool post turrets, cross slides, and other equipment —for every make and size of lathe.

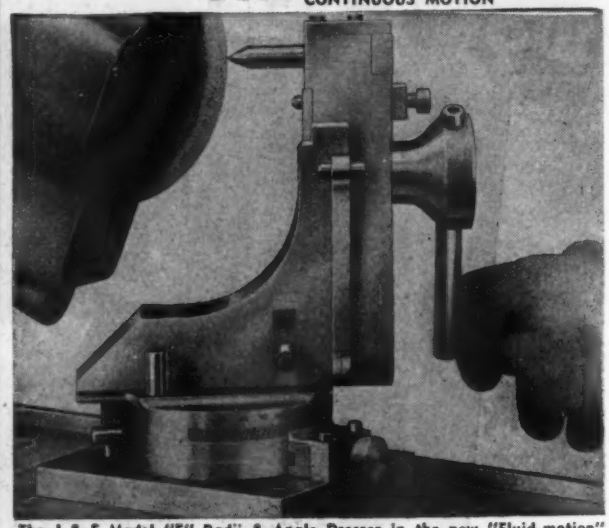
As carefully and accurately constructed as the finest turret lathe . . . Tested and proven in exacting war production . . . LYNN turret equipment may very well provide the answer to your particular production problem.

Write for complete story today— or consult your jobber.

LYNN MANUFACTURING COMPANY
224 ELROY STREET MINNEAPOLIS 8, MINN.

USE *Fluid-motion* for modern form-dressing

ONE SETTING HANDLE CONTINUOUS MOTION



The J & S Model "E" Radii & Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.

FEATURES

Fluid-motion dressing.
.0001" accuracy.
Automatic centering.
Chatterless and dustproof.
14" wheel capacity.
Versatile and adaptable.

J. & S. TOOL CO.
477 MAIN STREET
EAST ORANGE 1, N. J.

Johnson SHUR-GRIP DRILL VISE

$15.50 EACH

"SHUR-GRIP" Vise shown on drilling job at Reynolds Machinery Co., Ship St., Rebuilding Plant, Providence, Rhode Island.

The "SHUR-GRIP" holds round, flat or rectangular parts — the latter in vertical or horizontal positions. Vise jaws contain grooves for holding rounds up to 2" in diameter, are of hardened steel, 5" wide and open 5".

The "SHUR-GRIP" cuts drilling set-up time 75% to 90%.

Send for illustrated bulletin and price list NOW! Address Dept. A.

JOHNSON TOOL COMPANY
LAWRENCE H. COOK, OWNER
PLASTIC MOLDS—TOOLS
[illegible]

Inspection is Routine

WHEN GRINDING WITH

SAFETY

GRINDING WHEELS

No matter how critical your inspectors may be, they'll find mighty few "rejects" among the jobs where SAFETY Grinding Wheels are used. The finished product is so uniformly smooth, dimensions so nearly to scale, that inspection truly becomes largely a matter of routine. That's because SAFETY has the right bond for every job—each wheel embodies years of grinding experience, and is tested and proved under every condition. And along with superior, grinding finish and accuracy, SAFETY Grinding Wheels cut faster, step up production, last longer, and reduce cost.

Let us tell you more about the complete SAFETY Grinding Wheel service that helps to put grinding operation on a more economical and profitable basis. Write any of the SAFETY offices listed below.

FOR YOUR CONVENIENCE

You are invited to use the services and facilities of any of the SAFETY offices and warehouses listed below. They are staffed by experienced, competent men who can talk your language.

SAFETY

GRINDING WHEEL AND MACHINE COMPANY

Main Office and Factory SPRINGFIELD, OHIO, Phone 4651

● Birmingham—3-3323 ★ Chicago—TRiangle 8308 ★ Cleveland—MAIN 6479-80 ★ Detroit—TOwnsend 3-4740
★ Pittsburgh—ATlantic 5218 ★ Erie—23-093 ★ Philadelphia—WAlnut 3132 ★ St. Louis—CEntral 3676
★ Syracuse—3-2131 ● St. Paul—Midway 4774 ● Milwaukee—Mitchell 0265 ★ Toledo—MAin 6637

● *Sales Offices and* ★ *Sales Offices and Warehouses for Better Service!*

CUT HOLES, DISCS, GASKETS, ETC. . .

. . . with *RIEGER* CIRCLE CUTTERS

Sometimes the hole is wanted; sometimes the disc which comes out of the hole. It's all the same to the Rieger Circle Cutter.

You can use this handy tool for making circular cuts of 2" to 8" diameter in sheet metal, wood, fibre, rubber, composition, or plastic. Circle cutters have been ordered by many manufacturers of radios, ranges, refrigerators, airplanes, automobiles, furniture, etc.

The cutters are also popular in general machine shops for cutting holes in sheet materials and for making gaskets. In the latter case, arms with two bit holders are frequently furnished.

The Circle Cutter is made in two standard models. One has a No. 2 M. T. shank as illustrated. The other has a ½" straight shank. Either model complete with Pilot Drill and Bit, $18.00. Special models will be made to order.

Mail coupon or write for complete data on Circle Cutters and other Rieger tools.

REPRESENTATIVES:

Harry E. Hummer, 115 Montclair Ave., Newark, N. J.; Jack Brewer, 1151 S. Broadway, Los Angeles 15, Calif.; Schellenbach Machine & Tool Co., 480 Fifth St., San Francisco 7, Calif.; Bridge Machinery Co., 708 St. Paul Street, West, Montreal, Que., Canada.

THE RIEGER MFG. CO.
Dept. AM-7, Miamisburg, Ohio.

Send complete information on your Circle Cutters, Multifacers, Spindle Stops, and Die Holders.

NAME

COMPANY

STREET ADDRESS

CITY • ZONE STATE

NATIONAL KEYSEATING MILLER

. . . the tool that converts drilling machines into key-seaters and saves time and money

• With this modern tool you can handle keyseating jobs not suitable for keyseating machines on any of your drill presses or radials. Keyseats with parallel sides, accurate in depth and in perfect alignment with bore axis are assured.

The National Keyseating Miller mills, keyseats in one cut. It can be used on taper holes, offset holes, blind holes and for taper keys. Work clamping is unnecessary. We also manufacture oil-grooving millers.

•

Made in twenty-six different diameters from ½" to 3½". Several widths of cutters can be used in each size.

WRITE TODAY FOR OUR NEW CATALOG NO. 15

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

HARDNESS TESTER

Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL

Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4090

D&T MICROMETERS AND SNAP GAGES

Tubular welded frames with forged ends insure a maximum of accuracy with a minimum of weight.

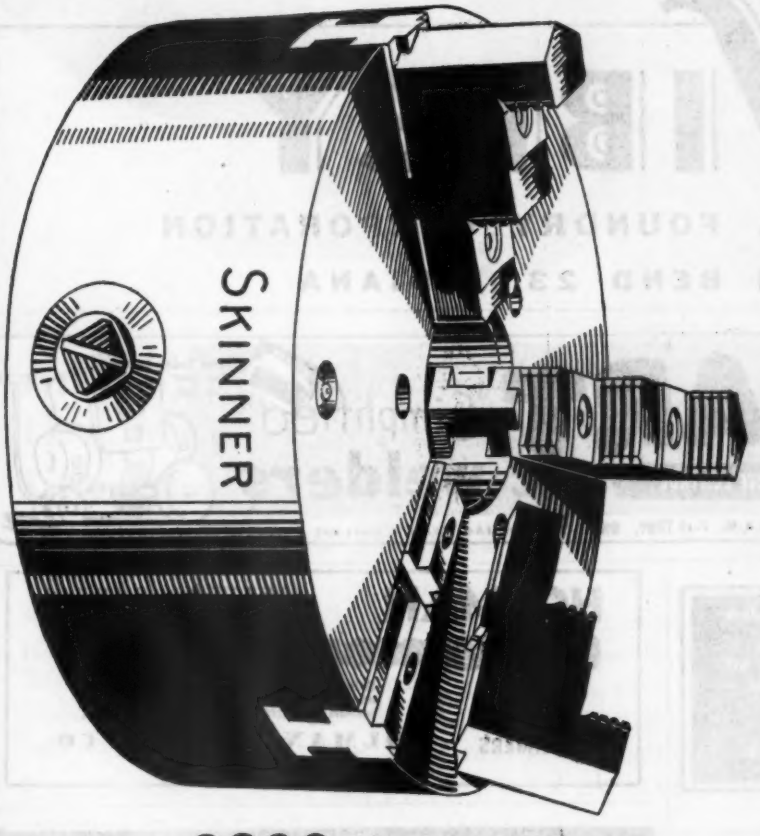
There are a variety of types available with either micrometer heads or dial indicators to cover a range of capacities from 0 to 168 in. . . . ***Write for Bulletin 200*** or outline your gaging problems.

• D & T Bow Micrometer 0 to 6 in. capacity

Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
6411 W. Burnham St. Milwaukee 14, Wisconsin

SKINNER *Chucks*

MODELS, SIZES AND TYPES *for any machine and every job...*



SERIES **3900** SELF-CENTERING
SCROLL CHUCK

Skinner 3-Jaw Self-Centering Scroll Chucks are made with the strength and accuracy required in modern production practice.

The Series 3900 illustrated has a forged steel body with heavy ribs to guide the jaws in their proper plane and is provided with Alemite fitting for lubrication of all moving parts.

All moving parts are made of suitable alloy steels properly heat treated for their respective functions. The jaw lands, steps and end bites are ground after assembly and tested to run within .003" total indicator reading.

Skinner self-centering chucks are made with either steel or semi-steel bodies and with 2-piece jaws or two sets of solid jaws. This type of chuck is furnished with flat back for threaded spindles or with taper seat backs for direct mounting on standardized taper spindle noses.

Write for new catalog No. 57 which gives complete information on all Skinner products.

THE SKINNER CHUCK COMPANY SKINNER CHUCKS **342 CHURCH ST., NEW BRITAIN, CONN.**

HAND & POWER OPERATED MACHINE CHUCKS—AIR CHUCK EQUIPMENT—FACE PLATE JAWS—MACHINE VISES

WHERE THE ARMS OF WAR ORIGINATE

MACHINE TOOLS form the basis for a war production program. An untold number of precision drilling operations must be performed to produce superior fighting equipment. And in the tooling for this war Sibley Drilling Machines have played an important part.

SIBLEY

MACHINE & FOUNDRY CORPORATION

SOUTH BEND 23, INDIANA

HOBART
"Simplified"
arc welders
with the original and exclusive REMOTE CONTROL
Send Today for your Catalog
HOBART BROTHERS CO., Box A.M. 7-19 TROY, OHIO "One of the World's Largest Builders of Arc Welders"

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

HOLMAN BETTER, FASTER HOLE FINISHING

HELICAL
TAPER PIN
REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.
MANCHESTER, CONN.

Whoever thinks of hardness testing equipment thinks of the

"ROCKWELL" HARDNESS TESTER

Now and always made only by

WILSON

MECHANICAL INSTRUMENT CO. INC.
357 Concord Ave., New York 54

An Associate Company of American Chain & Cable

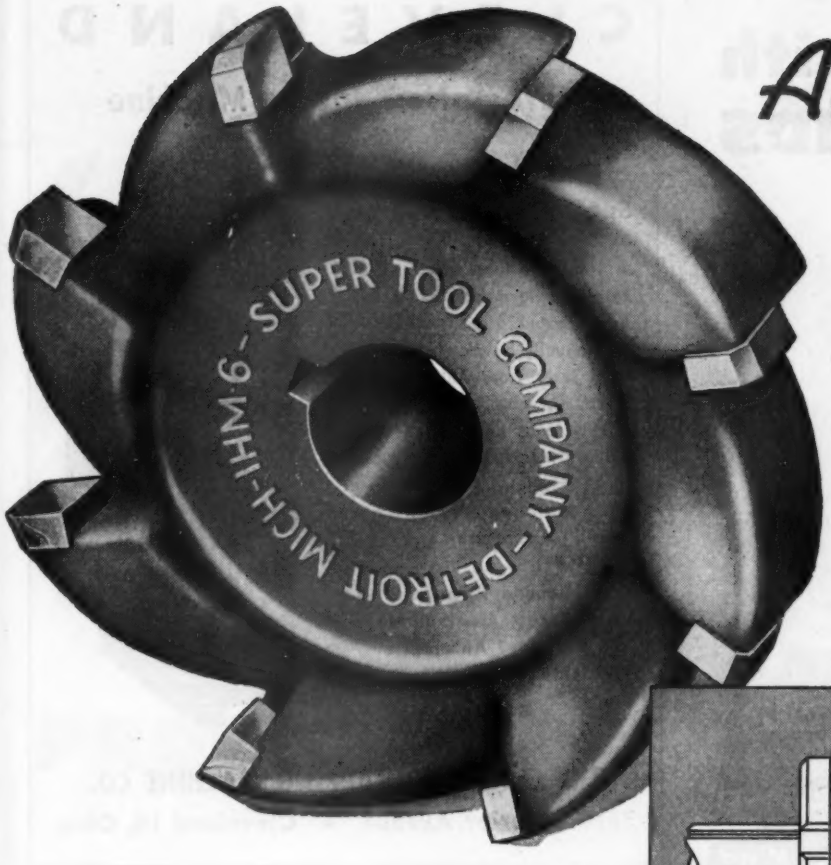
CRAFTS

Consistent Quality

GAGES AND TOOLS

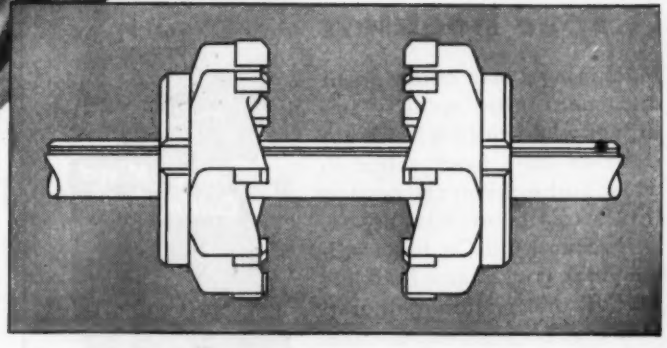
ARTHUR A. CRAFTS COMPANY, INC.

603 Newbury Street
at Kenmore Sq. BOSTON
DETROIT · CHICAGO



Announcing-

the New SUPER HALF SIDE MILL!



Designed to be used in pairs for straddle milling or singly to cut on one side only

Another Addition to the Most Complete Line of Carbide Tipped Cutters on the Market!

Here's another Super development—another addition to Super Tool's extensive line of Carbide Tipped Tools! The New Super Half Side Mill!

Here is a rugged, heavy duty tool designed for the tough jobs . . . those production jobs that are too heavy for regular half side mills.

Made in both right hand and left hand, these half side mills are available in a range of sizes from 4" to 12" in diameter. They are manufactured in three types for non-ferrous, cast iron and steel. Designed for straddle milling, they can be mounted individually on an arbor to cut on one side only.

Most sizes are now available for immediate delivery from stock. The complete range of sizes will be available from stock soon. Write, wire or phone for complete data and prices.

Whatever
YOUR CUTTING JOB
LOOK *FIRST* TO
SUPER

★

CARBIDE TIPPED TOOLS FOR
Turning, Facing
Reaming Forming
Spot Facing
Boring Grooving
Grinder Rests
Wear Parts
Counterboring
Shaving Centers and Special Purposes

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California

To Help You CUT COSTS with CUTTING FLUIDS

...Four Booklets

Machining costs come down and machining quality improves when cutting fluids are selected and used scientifically. To help you use cutting fluids to better advantage, D. A. Stuart Oil Co. has available four pocket-size booklets full of information gathered from over 80 years experience.

1. Cutting Fluids for Better Machining. A comprehensive 60-page hand-book on cutting and grinding fluids. Contains much data on general machining as well as oils.

2. Grinding with Oil. Deals with the use of oils for production, precision grinding.

3. The 577th Oil. Contains twenty-two case studies showing results of proper oil application.

4. Water-Mixed Cutting Fluids. A new booklet which explains the "how" and "why" of so-called "soluble oils" and gives many tips on how to handle them.

These booklets are yours for the asking. Indicate by number which you are interested in.
D. A. Stuart Oil Co. Limited. 2729 S. Troy Street, Chicago 23, Illinois.

D. A. Stuart Oil CO.
LIMITED
ESTABLISHED 1865
Stocks in Principal Metal-Working Centers

CLEVELAND

Automatic Tapping Machine

Model DB with Special Rapid Approach

- Here is a high speed, accurate tapping machine that can be operated 100% automatic or manually by the simple turn of a lever from *Automatic* to *Hand*. On automatic, operator merely loads and unloads machine after each tapping cycle.

The Cleveland has FIVE Outstanding Advantages

Rapid Approach and Retract

Split Second Reverse

Lead Screw Controlled

100 Per Cent Automatic

Precision Depth Stop

Full descriptive bulletin available. Write for your copy today.

THE CLEVELAND TAPPING MACHINE CO.
3610 Superior Avenue • Cleveland 14, Ohio

DIES GEO MET RIC *TAPS*

Right in the Lead

THE GEOMETRIC TOOL CO.
NEW HAVEN 15, CONN.

Famous for

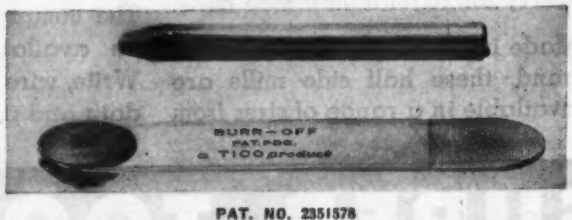
- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on page 238 Jan. 18, '45, American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Los Angeles; A. C. Behringer, 824 N. San Pedro St., San Francisco; Guy Reynolds, 404 Vernon St., Oakland, Canada: F. Barber Machinery Co., Toronto, Canada.

"BURROFF"



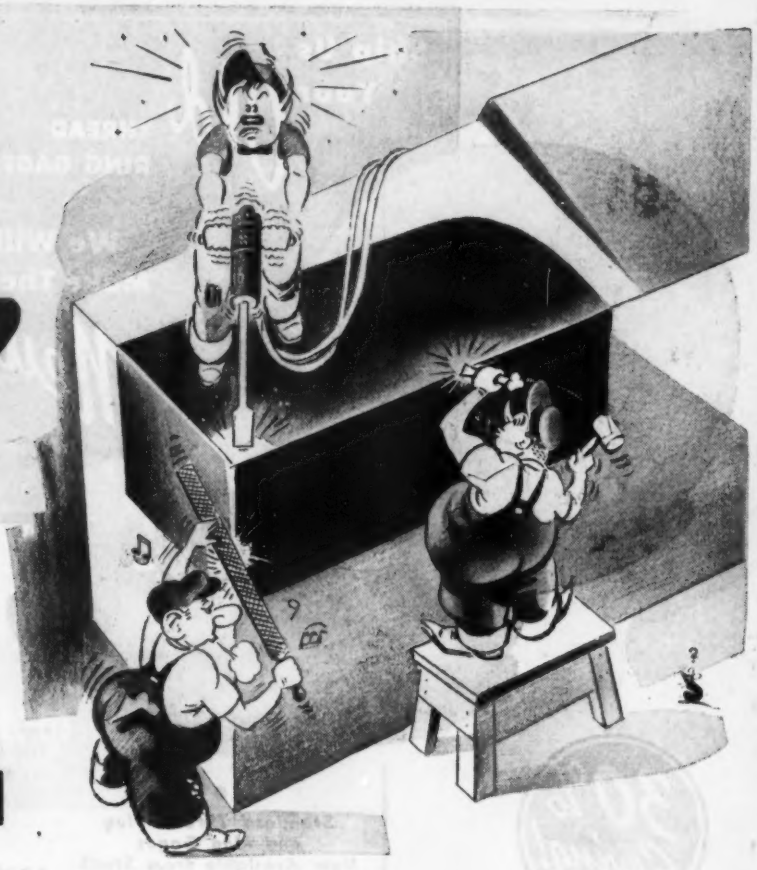
PAT. NO. 2351578

For fast clean removal of burrs and chamfering holes (inside & outside) of multi-walled parts—where regular solid countersinks will not reach.

CONTACT:
JOHN H. GRAHAM & CO.—105 DUANE ST., N. Y. C.

MADE BY
TOOL IMPROVEMENTS CO. — SEAFORD, NEW YORK

Less Tool Breakage



ANOTHER REASON WHY YOU GET MORE PRODUCTION

WITH TECO CEMENTED CARBIDE

Cemented carbide is well-known for its hardness—but hardness alone is not enough in a **cutting tool!** Equally important are toughness and uniformity of structure, properly combined to offer greatest resistance to breakage.

TECO metallurgists—pioneering for over 25 years on cemented carbide **as a cutting material**—have mastered the technique of incorporating hardness with unusual toughness and density. As a result, TECO Cemented Carbide holds cutting edges longer—produces more pieces per grind—reduces down-time.

Tool up several machines with TECO Cemented Carbide in place of present carbide tools and see for yourself that you get more production out of TECO tools. Discuss your needs with one of our tool engineers. Write for catalog and price list.

ARMY E NAVY

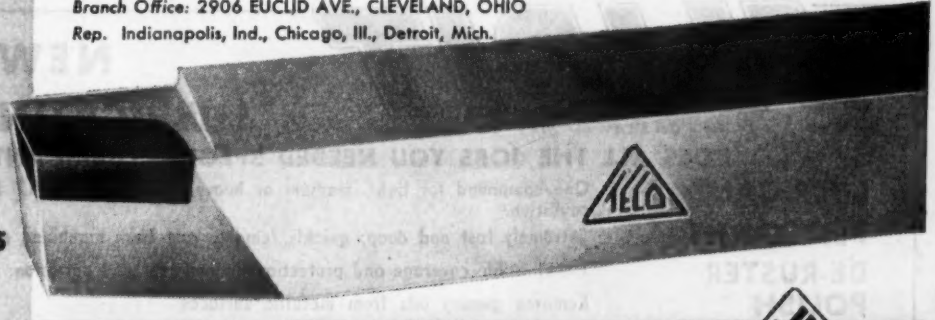
TUNGSTEN ELECTRIC CORPORATION 568 39th Street, UNION CITY, N. J.

Branch Office: 2906 EUCLID AVE., CLEVELAND, OHIO

Rep. Indianapolis, Ind., Chicago, Ill., Detroit, Mich.

USE TECO CEMENTED CARBIDE FOR

More Pieces Between Grinds
More Grinds Per Tool
Less Down Time
Lower Tool Cost



TECO *Pioneers in Tungsten Carbides for over a Quarter Century* TELO **CEMENTED CARBIDE**

Ship Us Your *Old* THREAD RING GAGES! We Will Make Them *New!*

SAVE time in getting Thread Ring Gages for rush work! Ship us your worn gages and let us give them a new lease of life! We re-lap the worn threads on pitch diameter, re-lap the major diameter to sharp V, eliminate bell-mouth, enlarge the slots and replace worn bushings, adjusting screws and locking nuts when necessary.

Unless the gages are so badly worn that they are hopeless, we make them as good as new—at a saving of 30% as compared with the cost of new gages.

NOTE: When sending special pitch-diameter gages, be sure to send also the setting plugs.

Write for Literature

30% Saving!

Standard Thread Plug and Ring Gages Now Available from Stock

The **STANDARD** *Thread-Gage* **COMPANY**

15922 FENKELL **DETROIT 27, MICH.**

RANDALL & STICKNEY

Universal Gauge

for rigid inspection of a wide range of parts . . .

An almost unlimited use is offered by this instrument for inspecting duplicate parts in quantity or any small parts with flat surfaces or recesses.

Use of standard blocks made possible by raising or lowering table increases capacity to take material up to 2" in height. Graduated to read to .001 inch; height 9¾"; weight 5 lbs. 1¼ oz.; depth from frame to spindle 1⅝".

Full details on request

Can be supplied with sliding head and table; also on a stand with throat 3" deep.

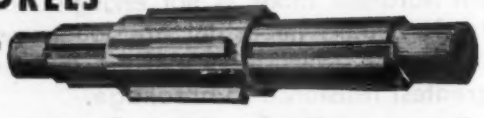
RANDALL & STICKNEY

Makers *Waltham 54, Mass.*

★ ★ ★ ★ ★

NICHOLSON E-X-P-A-N-D-I-N-G MANDRELS

ARE



Time-Tested "Time Savers"

Set of 19 of these economy, precision tools does the work of 193 solid arbors. Hardened tool steel. Two types, all sizes. Sold singly or in sets. Prompt delivery. *Bulletin 1043.*

Other Products: Steam Traps, Control Valves, Arbor Presses, etc.

W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

SLIPIT

REG. U.S. & CAN. PAT. OFF.

NEW 5 WAY LUBRICATING COMPOUND

DOES ALL THE JOBS YOU NEEDED SPECIAL LUBRICANTS FOR BEFORE

LUBRICANT	One compound for light, medium or heavy lubricating, SLIPIT keeps all tools and machines in A-1 condition.
PENETRANT	Extremely fast and deep; quickly removes rust from machined and cast surfaces.
DE-RUSTER	Unbelievable coverage and protection against rust and corrosion.
POLISH	Removes gummy oils from metallic surfaces.
CUTTING OIL	Superior for machining, drilling and tapping of aluminum, copper, soft brass, white metal and other alloys.

25¢, 65¢, $1.20, $4.00 at hardware, 5 & 10, Department and Sears Roebuck Stores.

SLIPIT PRODUCTS INC. **169 WATER STREET** **NEW YORK CITY**

HARD CHROMIUM

has "something" YOU can use!

to maintain accuracy

to prevent corrosion

to reclaim worn parts

to resist heat

to reduce wear

to eliminate seizing

to salvage off-size parts

to increase tool life

Let UNITED CHROMIUM Help You Get It

THE WAR CONTRIBUTIONS of chromium plating—how it saved the day for many a vital project—will not be filed away in military archives. Why? Because every property, every advantage, every technique has its counterpart in industrial and commercial applications.

The significant point is that electrodeposited chromium offers you a *proven* means of saving time and materials, of stepping up production, of improving the performance of a product. This is the result of an unusual combination of properties that can be obtained in a chromium plated surface, including – extreme hardness, resistance to wear, abrasion, heat and corrosion, and a very low coefficient of friction.

Remember, United Chromium has "lived" with chromium plating for years. Moreover, we have engineered it into a tremendous variety of successful applications, complete information on which is available both to our present licensees and to interested manufacturers. As a first step toward determining the applicability of Hard Chromium Plating in connection with your work, write to our nearest office, briefly outlining your problem.

OTHER U. C. PRODUCTS AND PROCESSES TO SERVE YOU

☆**UNICHROME ALKALINE COPPER** for smooth lustrous copper plating in a non-cyanide bath.

☆**ANOZINC** salts for anodic treatment of zinc giving greatly increased corrosion-resistance.

☆**UNICHROME DIP** for increased corrosion resistance of zinc and cadmium—without electric current.

☆Trade Mark U.S. Pat. Off.

☆**UNICHROME STRIP** for speedy removal of copper, chromium, zinc, etc.

☆**UNICHROME RACK COATINGS**

☆**UNICHROME STOP-OFF LACQUERS AND COMPOUNDS**

☆**UNICHROME Clear and Pigmented LACQUERS**

☆**UCILON** corrosion-resistant coatings for protecting surfaces against acids, alkalies, water, gasoline and various corrosive chemicals.

UNITED CHROMIUM
INCORPORATED
51 East 42nd Street
New York 17, N. Y.
Waterbury 90, Conn. · Detroit 7, Mich.

COATED ABRASIVE *Facts* at your fingertips!

Mechanics! Engineers! Shop Men! Users and buyers of coated abrasives! Here, in this new 36-page handbook, just off the press, you can obtain up-to-date, authoritative information on modern coated abrasives. Here, *for the first time,* you can find *all* the facts you should know in order to specify coated abrasives intelligently.

What is the difference between technical and non-technical abrasives? What are the several kinds of backings, coatings, grain sizes and on what jobs should each be employed? How should coated abrasives be stored in order to retain maximum strength and work value? How should they be ordered? These and hundreds of other questions are thoroughly discussed and answered.

For your FREE copy of this valuable handbook, fill in and mail coupon below.

CLOVER MFG. CO.

Norwalk, Connecticut

Quality Abrasives and Performance Since 1903

GET YOUR FREE COPY TODAY . . .
RETURN COUPON

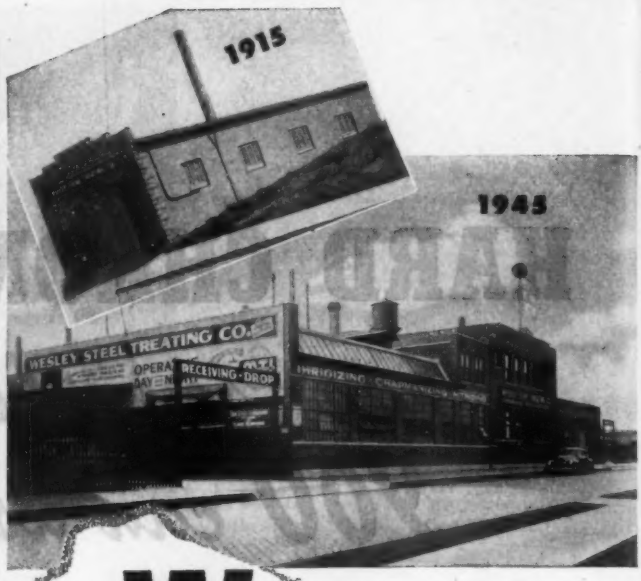
Name _____

Company _____ *Position* _____

Address _____

_____

AM .



Wesley
of Wisconsin
–Metal Treaters

OBSERVES 30 YEARS OF SERVICE TO INDUSTRY

It is with a spirit of thankfulness that we approach the milestone — July 12, 1945 — which marks the completion of our first thirty years.

We are grateful to the many industrial concerns, large, medium and small, whose confidence in our skill and integrity has enabled us to grow to a position among the nation's leaders in our field.

We are grateful to the loyal Wesley workers who, by their ability and unstinting effort, have made it possible for us to render an expanding service and who have brought honor to their company as the first steel treating company in Wisconsin to win the Army-Navy "E" and the first of its kind in the United States to win *both* the "E" *and* the Army Ordnance Banner.

Under the leadership of our president, Charles I. Wesley, who, with his father, the late Charles Wesley, Sr., founded this company on July 12, 1915, we face the next thirty years with confidence. This confidence is born of our faith in the future of America and American industry and is backed up by our pledge to serve to the limit of our ability in the months of war that lie ahead and in the long years of peace which we pray will follow.

WESLEY STEEL TREATING CO.
1321-1403 West Pierce Street Milwaukee, Wisconsin

THE UDYLITE
MULTIPURPOSE BARREL
FOR BULK FINISHING OF SMALL PARTS

● **The MULTIPURPOSE BARREL is designed to handle a one basket load. It loads and unloads easily and quickly—no hoist required and no doors to fuss with. Cup-shaped parts can be revolved at drain position for minimum dragout.**

All gears and bearings are above solution level. A choice of cathode fixtures assures constant, positive contact with any size or type of load.

This equipment is available in various combinations of cylinder and tank construction for tumble cleaning, electrocleaning or cyanide plating, acid plating, acid tumbling, rinsing or drying. It's just what you have been looking for. State your requirements when writing for prices.

THE Udylite CORPORATION
1651 EAST GRAND BOULEVARD
DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

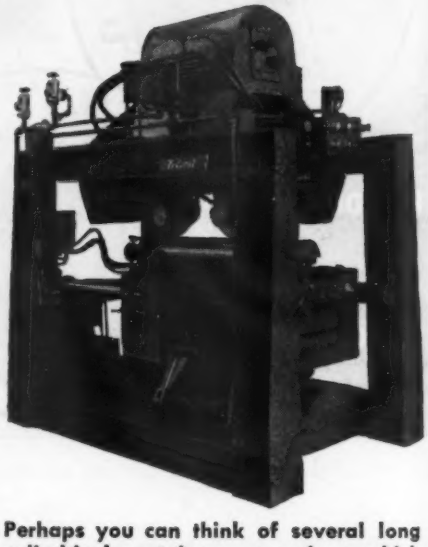
SPECIAL SHAPES?...Yes They Can Be RESISTANCE WELDED On *Federals*...

WHILE the information in these pages is particularly interesting to designers and producers of metal containers, it is also significant to fabricators of metal goods of all kinds, because: . . . Despite a general lack of understanding, **resistance welding IS adaptable to high-production automatic fabrication of special shapes.** Consider the five Federal Resistance Welders illustrated herewith. They are welding blitz cans, ammunition boxes, parachute flares . . . but the same type of machines could be producing . . .

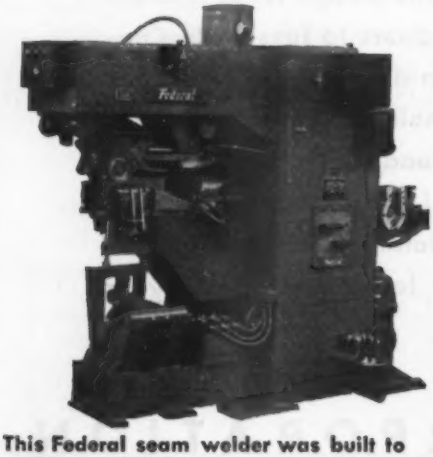
A variety of Containers for the goods of normal living . . . automotive accessories . . . house heater casings . . . refrigerator liners . . . evaporators . . . condensers . . . transformer cases . . . machine or instrument housings . . . fan housings . . . tool boxes . . . tote boxes . . . tanks . . . tubs . . . pails . . . oil cans . . . washing machines . . . hundreds more of products wherever the quantity is great enough to warrant investment in special machinery, and of course still more hundreds of less special shapes for which there are standard Federal Resistance Welders in great variety.

The point is . . . **resistance welding is not limited to the narrow field of usefulness encompassed by general knowledge.** It is a **better** form of welding, and a **versatile production tool.** It is worth while for anyone concerned with metal fabrication at low cost to get all of the facts about resistance welding.

Federal is willing, and able, to give you such information if you will **tell us what you want to know about resistance welding.**

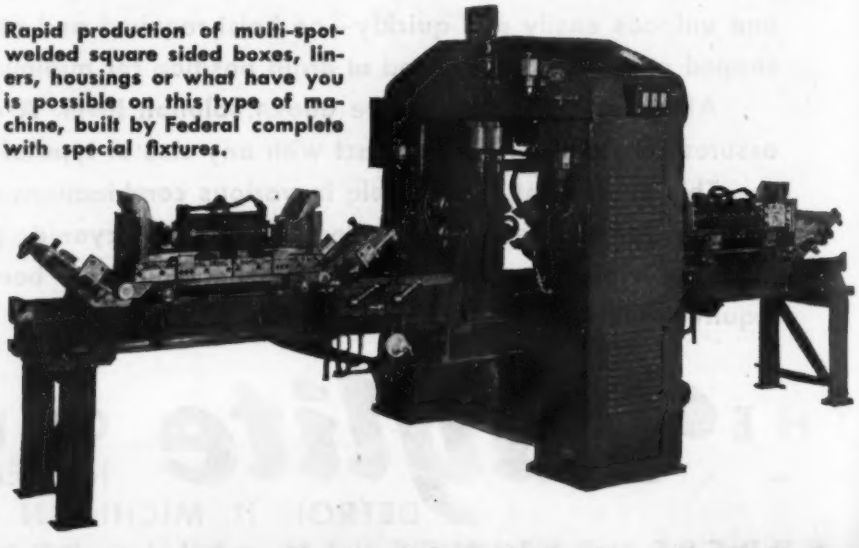


Perhaps you can think of several long cylindrical containers or casings which could be made by this type of machine, here producing parachute flare bodies.



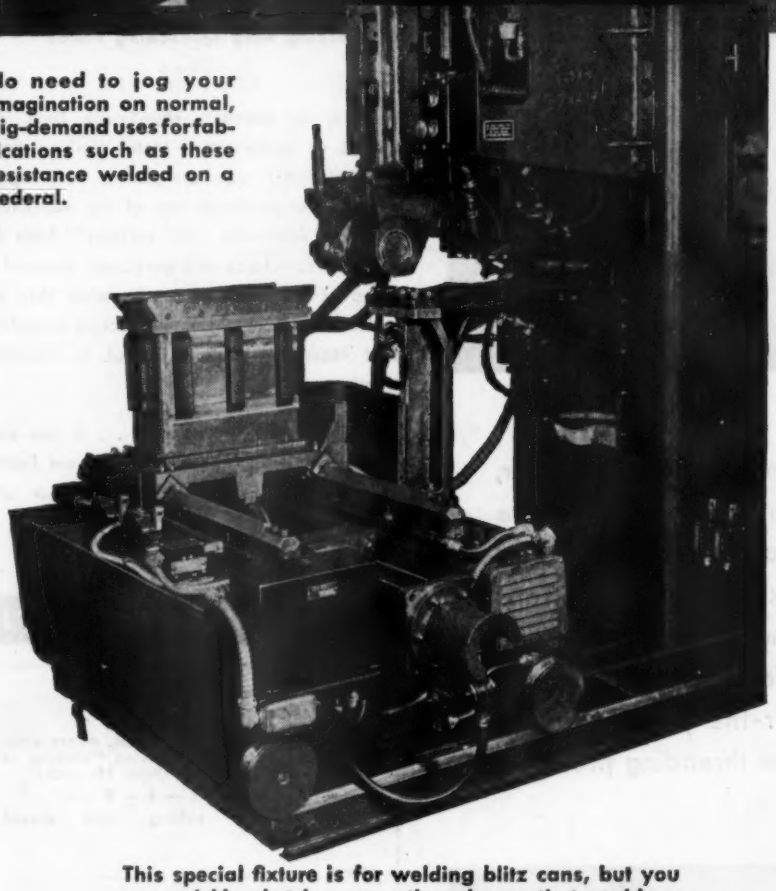
This Federal seam welder was built to weld ammunition boxes, but could produce every-day goods containers with simple die changes.

Rapid production of multi-spot-welded square sided boxes, liners, housings or what have you is possible on this type of machine, built by Federal complete with special fixtures.



THE FEDERAL MACHINE AND

No need to jog your imagination on normal, big-demand uses for fabrications such as these resistance welded on a Federal.



This special fixture is for welding blitz cans, but you can quickly sketch many other shapes that could go into production on this machine.

WELDER CO. 230 Dana Street WARREN, OHIO

VERSATILE MODERN PRODUCTION TOOLS

400 WELDED PAILS PER HOUR

An ingenious application of automatic resistance seam welding to the fabrication of five-gallon pail bodies has been developed by The Federal Machine and Welder Company, is currently producing 400 bodies per hour for a large manufacturer of containers. Operator merely inserts formed body in special indexing fixture, presses foot pedal. Balance of operation is automatic, including ejection of finished body. Still greater production is in sight with design improvements newly added to this machine, which is adaptable to fabrication of any cylindrical container, not restricted to five gallon capacity.

WELDING RADIO TUBES

Producing metal radio tubes in vast quantities with a low percentage of "leakers" is a problem. It is being very successfully done by projection welding on an ingenious press type welder developed by The Federal Machine and Welder Company. The machine produces a triple weld . . . welding the socket to the filament assembly and these to the casing. It is all done in one operation, automatically indexed and producing 2500 tubes per hour.

HOW BARRELS ARE MADE

Latest informative book to come from the press under the sponsorship of The Federal Machine and Welder Company is one describing in detail a complete steel barrel production plant designed and built by Federal. Built for army supply base use, the plant employs equipment adaptable to peacetime container fabrication, has a capacity of 70,000 barrels (55 gallons) per month. A limited quantity of these books are available to designers and fabricators of containers sufficiently interested to write, giving company name and individual title.

MORE ABOUT SPOT WELDERS

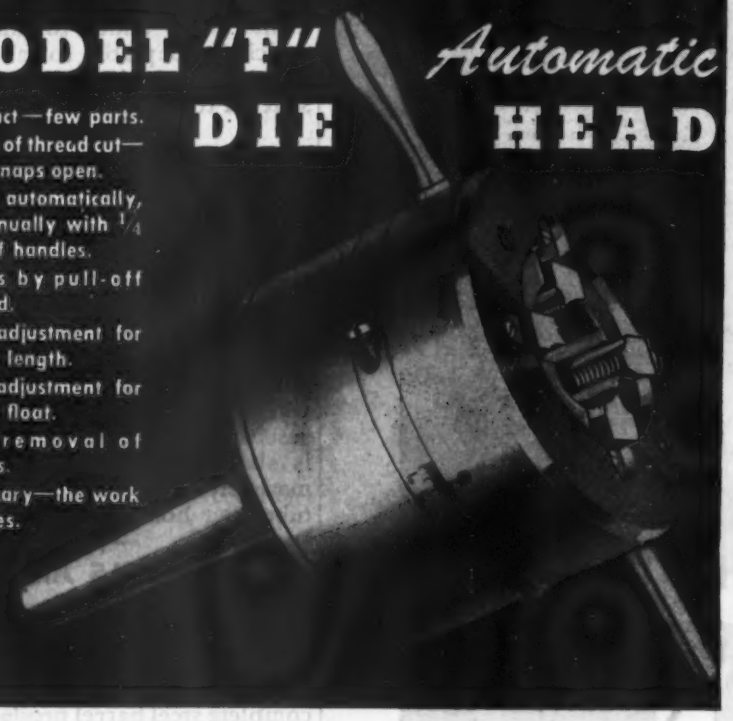
Condensed information on spot welders that is particularly useful to anyone not familiar with their application is featured in new bulletins now available for free distribution by The Federal Machine and Welder Company. "Type R" bulletin describes rocker arm machines for general utility welding. "Type P" bulletins are on the subject of press type welders for a wide range of spot, projection, "Percussion" and mash welding.

Rickert Shafer

FOR 35 YEARS

MODEL "F" Automatic DIE HEAD

1. Compact—few parts.
2. At end of thread cut—head snaps open.
3. Reset automatically, or manually with 1/4 turn of handles.
4. Opens by pull-off method.
5. Easy adjustment for thread length.
6. Easy adjustment for lateral float.
7. Easy removal of chasers.
8. Stationary—the work revolves.



R-S, for over 35 years has stood for Rickert-Shafer, and precision threading equipment. Over the years we have concentrated most of our attention on second operation tools, Die Heads of all kinds, Collapsible Taps and Boring Heads. We have found time to design and build thousands of Friction-type Tapping Machines and hundreds of special designed-for-the-job Threading Machines. What is your production threading problem? Write today.

RICKERT-SHAFER CO · ERIE, PA.

DIE HEADS · COLLAPSIBLE TAPS · BORING HEADS
TAPPING MACHINES · SPECIAL THREADING MACHINES

KNOW YOUR MATERIALS and how to work them

★

. . . send for these reprints of practical production data.

15¢ PER COPY

1. *Working of Aluminum Alloys*
2. *Working of Magnesium Alloys*
3. *Working of High Nickel Alloys*
4. *Working of Plastics*
5. *Working of Cast Copper-Base Alloys*
6. *Working with Quenching Fluids*

• Here, in compact, easy-to-use form, are digests of authoritative Metal-Working practice followed in war-busy plants. Each reprint appeared originally as one of the well-known *American Machinist* "blue sections." Each details characteristics of a particular material or group of materials . . . tells what they are and how to work them. Production executives find these compilations useful in employee training.

Check over the list above . . . if you want any reprints order them now while our limited supply lasts. Coupon below for your convenience.

MAIL COUPON TODAY!

American Machinist
330 W. 42 St., New York 18, N. Y.

Enclosed is $..... (stamps, money order or check) for the following "Working of Materials" reprints. (Price 15c each)

1 — 2 — 3 — 4 — 5 — 6

(Indicate by putting circle around number)

Name .....

Title .....

Company .....

Address .....

SAVING 215 GALS OF CUTTING OIL DAILY

. . . With One Tolhurst "Chip Wringer" at the Pyle National Company

WRINGING 4 TONS OF CHIPS IN 4-5 HOURS DAILY, this busy Chicago plant processes the turnings from 11 automatic screw machines and 1 thread miller in one Tolhurst "Chip Wringer." Result—125 gallons of fresh cutting oil from 2 tons of brass chips; 90 gallons from 2 tons of steel chips. Tolhurst "Chip Wringers" recover as much as 98.6% of the cutting oil—*by centrifugal force only.*

INCREASING SCRAP VALUE OF CHIPS, by wringing them is another saving to Tolhurst users. Dry chips from the wringer are normally ready for remelt and re-use.

A FRESH SUPPLY OF CUTTING OIL, always available, encourages a conscientious use—and *reduces tool wear.* As much as 50% increase in tool life has been shown by toolroom records after installing Tolhurst equipment.

OPERATED BY UNSKILLED HELP, Tolhurst "Chip Wringers" present a real economy. The routine is simple and rapid, enabling a plant to keep its floors clean and thus *reduce fire and accident hazards.*

Descriptive bulletins, installation data and prices are available on request.

ARMY E NAVY A M M

TOLHURST CHIP WRINGERS

TOLHURST CENTRIFUGAL DIVISION • *American Machine and Metals, Inc., East Moline, Illinois*

"Since 1852—CENTRIFUGAL MAKERS FOR THE PROCESS INDUSTRIES"

"DESIGN IS ALL IMPORTANT, EVEN IN A BATHING SUIT," EXPLAINED MISS DINGLE

-how much more so when it comes to the design of special machinery.

FENN SPECIAL MACHINERY FOR MORE EFFICIENT PRODUCTION

Fenn Special Machinery is custom-built to meet the user's individual needs . . . automatic and semi-automatic to speed up operations as well as eliminate hand operations. Fenn builds the tools as well as the machines — one responsibility. Plan for profits with Fenn.

THE FENN MANUFACTURING CO.
HARTFORD, CONNECTICUT

PALMGREN
ANGLE VISES

HEAVY-DUTY Model

For Quick — Accurate Set-ups

PALMGREN Heavy Duty Angle Vises are built sturdy and rugged for tough, heavy jobs. They are accurately graduated in degrees, can be quickly adjusted to any angle, stay locked under severe service and save valuable hours otherwise wasted in tedious make-ready, wedging or making temporary jigs and fixtures.

Jaws are hardened and ground. Special outstanding features are the size and opening of jaws—4" Jaws open full 4"; the 6" Jaws open full 6" etc., with corresponding depth of Jaws. Vise can be used as ordinary vise when lowered to horizontal position. Swivel bases furnished if desired. Sizes 4", 6" and 8" Jaws and openings. Prompt deliveries.

Write for Circular 347

CHICAGO TOOL & ENGINEERING CO.
Mfrs. of PALMGREN PRODUCTS for over 25 years
8354 SOUTH CHICAGO AVE. . . . CHICAGO 17, ILL.

PRECISION WORK AT ANY ANGLE

MANY IMPROVEMENTS in New Die Grinder Added to Keller Line

Increased-power pneumatic die grinder for high speed operation. 25,000 Rpm. One-piece aluminum alloy housing. Air-cooled cylinder prevents overheating even when run continuously. Three models. Write for catalog.

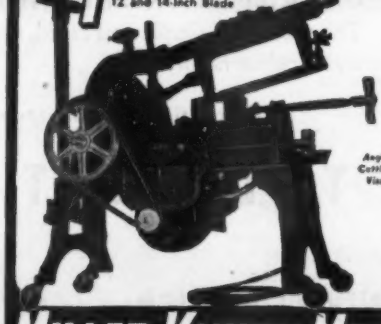
K KELLER TOOLS

KELLER
Pneumatic Tools

KELLER TOOL CO., 4507 Arbor St., Grand Haven, Mich.

POWER HACK SAW ★

12 and 14-inch Blade



LOW PRICED
•
PORTABLE
SELF-CONTAINED
•
READY TO WORK
STURDY
ECONOMICAL

Write for Bulletin No. 100

MILLER-KNUTH MFG. CO. OMAHA, NEB.

HALLOWELL

SHOP EQUIPMENT OF STEEL

FIG. 732
"HALLOWELL"
ALL-STEEL BENCH

. . . meets practically every shop requirement

The famous "Hallowell" Line comprises a variety of shop and plant necessities to meet practically every need. To thousands of users all over the country, "Hallowell" Equipment signifies sturdy steel construction, good design, years and years of wear and attractive prices.

"Hallowell" Work-Benches of Steel are an asset in any shop. Exceptionally strong and sturdy, they are built to stand firm and rigid without costly bolting to the floor. 1367 combinations to choose from . . . interchangeable sections . . . a wide range of heights, lengths and widths . . . with so great a choice you are almost certain to find exactly the bench for your requirements. Save yourself the trouble and expense of designing and constructing your own—order a ready-made "Hallowell" Work-Bench of Steel.

A smart addition to the "Hallowell" Line is our DeLuxe Shop Furniture of Steel. DeLuxe Work-Benches, designed in a number of arrangements to meet the specific needs of modern shops, have interchangeable shelf, cabinet and drawer units. One style of "Hallowell" DeLuxe Line Work-Bench is shown in the lower-left photograph above. Numerous other styles are now available.

The DeLuxe Line also includes Tool Stands and Foremen's Desks of Steel.

To be informed about the many styles and models of "Hallowell" Equipment, send for the "Hallowell" Catalog of Shop Equipment of Steel.

OVER 40 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PA. BOX 4

BRANCHES: BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

DON'T TAKE A CHANCE

with the DUST MENACE !

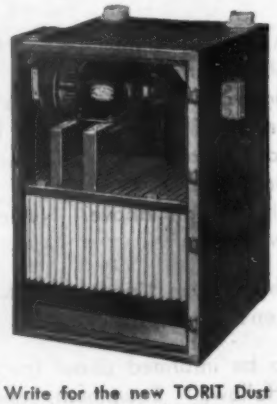
Get TORIT PORTABLE

DUST COLLECTORS

- *Safeguard your employees' health.*
- *Comply with health regulations.*
- *Protect valuable machinery from abrasive dust and grindings.*

TORIT Dust Collectors are the answer to the elimination of dust laden air.

They are made in various sizes, from ⅓ HP to 3 HP. TORIT steel cabinets contain motor, fan, fan-housing and a unique set of chemically treated, spark-resistant filter bags, which provide a highly efficient method of air filtering in small compact space.



Torit-ize for Safety

Write for the new TORIT Dust Collector catalog No. 29 giving full information and description of the different size units.

TORIT MANUFACTURING CO.
280 Walnut Street
St. Paul 2, Minn.

TORIT Dust Collectors
SELF-CONTAINED UNITS

"BUZZER" HIGH SPEED *Gas* FURNACES

Attain High Temperatures

without BLOWER or POWER
. . . just connect to gas supply

FULL MUFFLE FURNACES . . . reach temperatures of 2400° F. without blower or power. Ideal for heat treating high speed and Alloy Steels. Also available in Bench Models.

ATMOSPHERIC POT HARDENING FURNACES . . . tangentially-fired to assure even heat up to 1650° F. are used for Salt, Cyanide and Lead Hardening. Also adapted for Melting Aluminum.

Send for the complete "BUZZER" Catalog

CHARLES A. HONES, INC.
121 So. Grand Ave. Baldwin, L. I., N. Y.

Excellent plain vise — plus special fixtures

As a plain vise, the flush, parallel, four-square construction has many advantages. The optional Jig Attachments permit various special-holding and repeat-operation jobs.

GRAHAM MULTI-PURPOSE VISE

KNURL HOLDER FITTING LATHE TURRET
With work capacity up to 2½" dia., this "adjust-angle" tool produces many patterns of knurling using the same pair of straight knurls.

Request Illustrated Price Circulars

GRAHAM MFG. CO.
82 BRIDGE ST.
EAST GREENWICH, R. I.

No. 3 Littell Reel. Capacity, 300 lbs.

Reel-Off Coil Stock Faster at Less Cost with LITTELL REELS

COIL feeding with LITTELL Automatic Centering Reels increases production, lessens waste, improves quality, loads easier. Littell Reels are made in plain or motor-driven types for handling coils 100 to 20,000 lbs. Littell also makes Roll Feeds, Straighteners, Safety Feeders, etc.

Send for Bulletins

F. J. LITTELL MACHINE CO.
4169 Ravenswood Ave.
Chicago 13, Ill.

It's New!

WARCO TAPPING COMPOUND

REDUCES TAPPING COSTS!

PROLONGS TOOL LIFE!

CUTS BETTER THREADS FASTER!

Warco Tapping Compound is a semi-fluid white paste containing no lead. It saves production time because it is already mixed to the proper consistency for application with a brush or swab. It will not harden in service and is readily removed with clear water, alkaline cleaners or commercial solvents.

Warco Tapping Compound makes cleaner, more accurate threads. Faster speeds are possible and taps last longer. It is recommended for all types of steel, aircraft aluminum and other tough non-ferrous metals.

Warcolube — a companion product for the lubrication of tailstock centers is also available. It prevents galling and is readily removed from work pieces.

A Warren Lubrication Engineer will be glad to prove the superiority of Warco Tapping Compound and Warcolube, or, if you prefer, generous samples will be sent you immediately upon request. Write today!

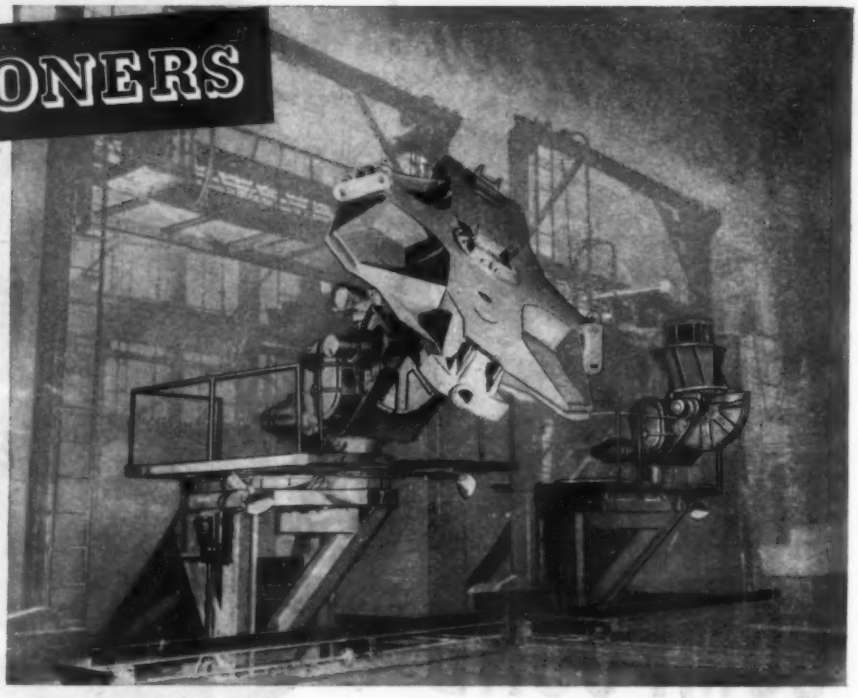
WARREN Specialized PRODUCTS

THE WARREN REFINING & CHEMICAL COMPANY

308 Euclid Avenue
CLEVELAND 14, OHIO

Production Set-Up Like This Forecasts a New "Shop Practice"

C-F POSITIONERS



By *welding* on C-F Positioners, some manufacturers far out-produced all estimates of "possible" "War Production." Not only did this method increase out-put, it saved material and increased strength and quality while lowering the cost per unit. Under post-war competition automatic welding on C-F Positioners is certain to become standard manufacturing practice for many products. It is a new method that permits downhand welding of all sides and angles from a single set-up. A method you should know and understand.

Write for Bulletin WP-22

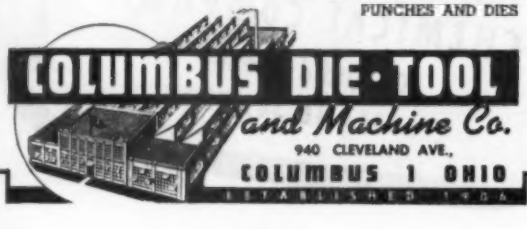
CULLEN-FRIESTEDT CO.

1313 S. KILBOURN AVE. CHICAGO 23, ILL.

OUR TOOL EFFICIENCY *is your* PRODUCTION EFFICIENCY

Efficient tool designing in post war competitive production is a "must". Our experience guarantees you tools—designed for economy of operation, resulting in your increased production at a lower cost.

JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



COLUMBUS DIE·TOOL and Machine Co.
940 CLEVELAND AVE.,
COLUMBUS 1 OHIO
ESTABLISHED 1906

MAKE EXTRA MONEY

SIMPLY — EASILY IN YOUR SPARE TIME

DO YOU work in an industrial plant or machine shop where many other technical men are employed?

DO YOU know that McGraw-Hill has a technical book to help almost every machinist, technician, engineer, or industrial worker in your organization to get ahead faster?

YOU can make extra money quickly and easily by simply telling these men with whom you work about the McGraw-Hill books that will help them in their particular jobs. We supply you with all information, catalogs, circulars, order cards—ship books directly to your customer—bill you at a LIBERAL COMMISSION.

OVER 2500 TITLES TO CHOOSE FROM

Start recommending these authoritative books **NOW!**

TURN YOUR SPARE TIME INTO DOLLARS

Send for details today

MONEY-MAKING COUPON

McGraw-Hill Book Co., Inc.
330 W. 42nd St., New York 18, N. Y.

Please send me without cost or obligation to myself your plan by which I can profitably turn my spare time into money.

Signed .....

Address .....

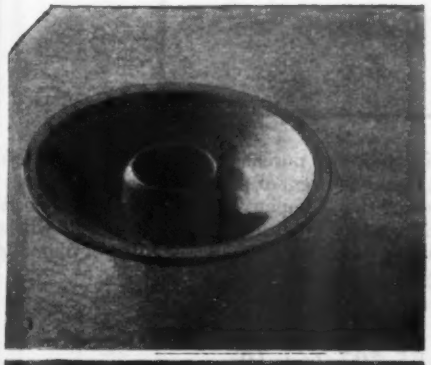
Company .....

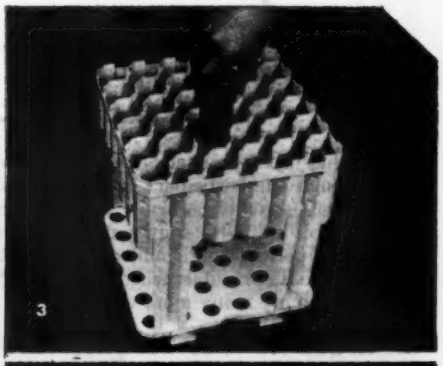
Position .....

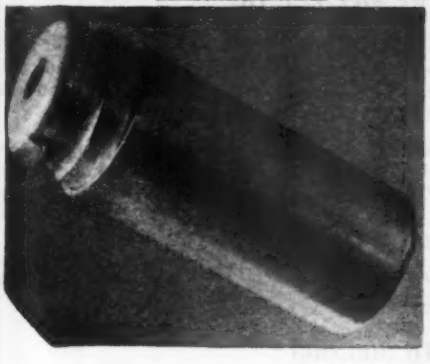
F. A. 7-19

Think of Stampings First!

WHEN YOU THINK of post war products be sure to consult with pressed metal experts *before you begin designing.* Stampings and stamping assemblies have for decades been a keystone of mass production. In war and peace the stamping industry has served all other industries . . . helping to achieve miracles of production . . . higher standards of living . . . a more powerful and prosperous America.

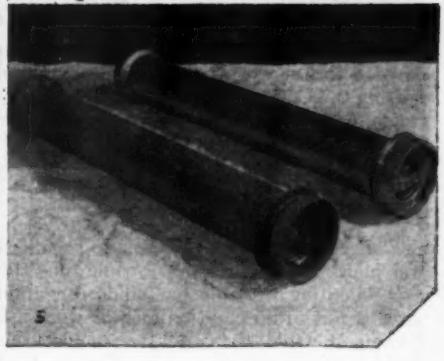






A FEW OF THOUSANDS OF WAR PRODUCTS MADE OF STAMPINGS

1. COINING TO CLOSE DIMENSIONS
2. ROCKET LAUNCHER TUBES
3. WELDED AMMUNITION BOX
4. HYDROSTATIC FUSE ASSEMBLY
5. 3" CARTRIDGE CONTAINER



THINK *of the incredible growth of the stamping industry during the war. More stampings have been made during the past two years than during the preceding ten. The experience gained by the industry as a result of this expansion will revolutionize thousands of products postwar. When you plan ahead plan to save time and money—think of stampings first!*

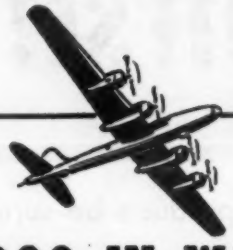
The Pressed Metal Institute is a nationwide association of leading pressed metal manufacturers, organized to advance the art and to assist other industries to take full advantage of latest stamping methods and techniques.

ADVANCE WITH STAMPINGS
PMI
PRESSED METAL INSTITUTE

PRESSED METAL INSTITUTE

829 UNION COMMERCE BLDG. · CLEVELAND 14, OHIO

BRIGGS PREPARES FOR PEACETIME MANUFACTURING



$626,000,000 IN WAR BUSINESS

51.7% FOR WAGES $323,640,000	2.16% FOR DIVIDENDS $13,520,000
34.32% TO SUPPLIERS $214,850,000	1.34% FOR DEPRECIATION $8,390,000
8.89% FOR TAXES $55,650,000	.88% FOR RECONVERSION $5,500,000

.71% LEFT IN BUSINESS $4,450,000

Briggs has just completed $626,000,000 worth of war business—1941 through the early part of 1945—consisting principally of large aircraft assemblies, heavy bomber turrets and heavy and medium tank hulls. Its employment rose from 23,000 to 36,565 in the same period, and it added almost a million square feet of floor space to its manufacturing operations. Still on its books and in production are many more war orders.

Changes in War Requirements Free Space for Peacetime Work

Now, however, due to changes in war requirements, facilities devoted to war work have been decreased about 20%, thus permitting the Company to continue to be able to meet its war contracts, and at the same time to begin to prepare for peacetime body manufacturing.

New Foundry Established In Cleveland

The reduction in war work also permits Briggs to make postwar plans in other fields. For some time the Company has been experimenting with plaster molds. Beginning with April of last year, it put into operation on war work a large new foundry in Cleveland, Ohio, using plaster molds exclusively and licensed under what is known as the "Capaco Castings Process." This will soon be available for making intricate and fine castings for peacetime manufacturing.

Plans Laid for Postwar Plumbing Ware Market

Briggs is also planning to re-enter the plumbing ware market on a large scale. On September 30, 1944 the John Douglas Company of Cincinnati, Ohio, was purchased—one of the country's oldest independent manufacturers of plumbing ware and plumbing fixtures. In securing this Company, Briggs has added enough plumbing ware facilities to what it already has so that it will be able, in the postwar market, to offer a complete line of plumbing ware for practically all purposes.

1944 Profits After Taxes Were $5,307,161.10

Briggs' profits after taxes in 1944 and after provision for renegotiation of war contracts, costs of plant reconversion, and other costs arising from the war, were $5,307,161.10, as compared with $5,239,350.74 in 1943.

The consolidated financial position of the Company and its domestic subsidiaries on December 31, 1944 showed current assets of $82,647,409.64 and current liabilities of $54,303,994.08, as compared with current assets of $99,657,442.40 and current liabilities of $73,985,660.70 in 1943.

The Company paid a $2.00 dividend per share of stock in 1944, the same as in 1942 and 1943.

To Spend $10,000,000 On Reconversion

Briggs' future plans call for the expenditure of approximately $10,000,000 for reconversion, re-equipping and new machinery. However, the Company believes that its principal job must continue to be production for war until final victory has been achieved in the Pacific. Until that time, the needs of the Armed Forces will always come first.

BRIGGS MANUFACTURING COMPANY — DETROIT 14, MICHIGAN

IN WARTIME:

BODIES FOR BOMBERS, FIGHTERS, TANKS AND AMBULANCES, AND BOMBER TURRETS.

IN PEACETIME:

BODIES FOR PASSENGER CARS AND TRUCKS, PLUMBING WARE, AND NON-FERROUS CASTINGS.

TOOL STEEL DATA

Revised data for High Speed Steels including types, analyses, uses, hardening characteristics and temperature ranges

(July 1945)

HIGH SPEED STEEL CHARACTERISTICS

TYPE	GRADE	ANALYSIS	USES	HARDENING CHARACTERISTICS	
				HARDENING TEMPERATURES	QUENCH RC
High Tungsten	CLARITE -T1H-	C .72 W 18.00 Cr 4.00 V 1.15	Lathe Tools Cutters Reamers Drills and Taps Broaches	Range: 2200 °F. to 2350 °F. For Maximum Cutting Capacity 2350 °F. For Hardness and Toughness 2300 °F. For Increased Toughness 2200 °F. (For Hot Work 2000 °F.)	Oil.....63–65 Salt Bath...63–65 Air.....60–63
Molybdenum Tungsten	MOLITE -M2H-	C .82 W 6.50 Mo 5.00 Cr 4.15 V 1.90	Lathe Tools Cutters Reamers Drills and Taps Broaches	Range: 2100 °F. to 2275 °F. For Maximum Cutting Capacity 2275 °F. For Hardness and Toughness 2200 °F. For Heavy Impact 2100 °F.	Oil.....63–65 Salt Bath...63–65 Air.....60–63
High Vanadium	VANITE -T2H-	C .82 W 18.50 Cr 4.25 V 2.15 Mo .70	Long Life: Form Tools Lathe Tools Milling Cutters Turning: Chilled Rolls Car Wheels	Range: 2300 °F. to 2350 °F.	Oil.....64–66 Salt Bath...64–66
Cobalt	MAXITE -T8H-	C .73 W 14.00 Cr 4.00 V 2.15 Co 4.75	Heavy Duty Turning: Axles Car Wheels Cast Iron	Range: 2325 °F. to 2375 °F.	Oil.....63–65 Salt Bath...63–65

TEMPERING: Double tempering is recommended. Temper cutting tools at 1050°F. for maximum secondary hardness. To increase toughness and resistance to heat checking on hot work applications, tempering temperatures up to 1300°F. may be used.

COLUMBIA TOOL STEEL COMPANY

MAIN OFFICE AND WORKS — CHICAGO HEIGHTS, ILL.

Branches and Warehouses: CHICAGO • CINCINNATI • CLEVELAND • DETROIT • MILWAUKEE

War production has taught us how to make stampings both better and cheaper

COMPLETE-PER-STROKE stamping production!

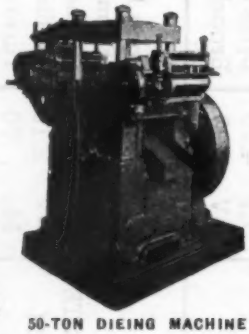
It is a matter of fact that during this war Dieing Machines have made stampings and performed operations never before done on presses. Items formerly machined have been converted to Dieing Machine production. Operations formerly requiring a series of machines have been put on regular or special Dieing Machines.

Great economies were thus effected. Nor was there sacrifice of quality. The precision of operation of the Dieing Machine is such that the stamped product can be consistently held within .0002" limits.

Unique Dieing Machine features make possible the unmatched combination of high production, high quality, and great versatility. Indirect Underdrive gives vibration-free operation. Upper crosshead is pulled downward, "Precision-guided" for accuracy which customarily adds 600% to 1200% to life of dies.

Pole piece for Diesel engine commutator assembly produced complete one per stroke, 120 per minute.

Can opener blade, requiring operations including sunken lettering and beveled blade, produced complete per stroke on Dieing Machine at greatly increased rate.



50-TON DIEING MACHINE

REQUEST CATALOG 45

THE HENRY & WRIGHT MFG. CO.

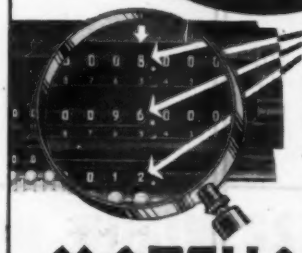
489 Windsor Street **Hartford 1, Conn.**

Henry & Wright Dieing Machines

for calculating

Cylindrical and Ball Gauge Readings

one of many uses!



All 3 factors in full view eliminate double calculating

MARCHANT

the electric calculator with straight-line figure dials for ALL 3 FACTORS!

Save the time of high-wage personnel now figuring with pencil and paper, or with eye-straining approximating devices having uncertain decimal points. A MARCHANT gives "the answer" quicker...correctly pointed off... and with *all 3* factors in plain sight for checking.

This is why MARCHANT is so popular in shop and drafting room...and explains why more and more firms are putting one within easy reach of each desk.

Investigate the Automatic Electric MARCHANT and be convinced.

NOW AVAILABLE WITHOUT PRIORITY

MARCHANT CALCULATING MACHINE COMPANY

HOME OFFICE: OAKLAND 8, CALIF., U.S.A.

Sales Agencies and Manufacturer's Service Stations Give Service Everywhere!

- ☐ *Please send* us information on MARCHANT.
- ☐ *Send* "7 place Natural Trig. functions with increments to Seconds" (*25 cents in stamps enclosed*).
- ☐ *Send* "Simplified Square and Cube Root Methods" (*no charge*).
- ☐ *Send pamphlet* "Conversion of Decimal Ratio to Common Fraction for Gear Design" (*no charge*).

*Firm*_____

*Individual*_____

*Address*_____

For Our America!

These are times of supreme action — action in which our America stands at the threshold of the greatest age of civilization. One barrier blocks our entrance — the formidable, determined enemy in the Pacific. He must be defeated, his barbarous creed and sanguine ideals destroyed, sluiced forever into the pages of history.

For our America, her future, her freedom — her rights to all mankind — these are the ideals of the men and women at Lawson. We're proud of our recent 5th Army-Navy "E" Award — we're proud of being Americans, of our birthright to work and fight for our ideals.

LAWSON MACHINE and TOOL CO.

120 MOUNTAIN AVENUE, MALDEN 48, MASS.

Reduce Tool Breakage with Howard Carbide Tool Holders

HOWARD
TOOL HOLDERS
Increase Accuracy
SHIMS AND BLOCKS ELIMINATED

Here's the HOWARD tool holder you've been hearing about—it's new—different—practical—saves time, money and increases accuracy from 200% to 400%. Available in 14 different models in sizes to handle all types of work. Prompt delivery.

NOTE THESE FEATURES:

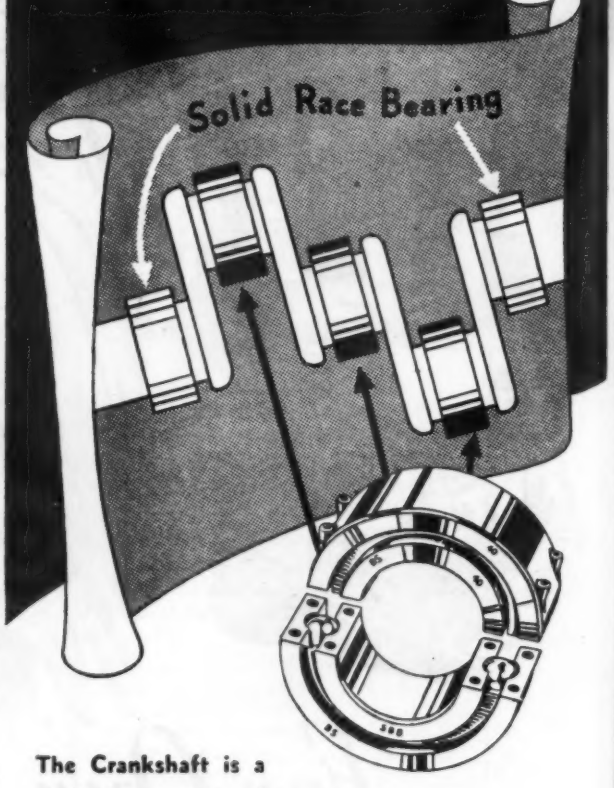
- **Eliminates tool spring or chattering.**
- **Vertical height adjustment, keeps tool clearance angle the same at any height.**
- **Tools easily removed for grinding without losing set-up.**
- **Constructed to give minimum over-hang of tool. Holder can be placed CLOSE to the work, minimizing tool breakage. Recommended for interrupted cuts.**
- **Save on tool cost because this holder permits the use of smaller tools to do the same job.**
- **Sturdily constructed—custom-made, fitted to your machine.**
- **Hardened head—Parker rust-proof finish.**

WRITE TODAY FOR DETAILED LITERATURE

Howard Dearborn, Inc.
3370 WEST 140TH STREET CLEVELAND 11, OHIO

TYPICAL APPLICATION OF SPLIT BALLBEARING

The CRANKSHAFT



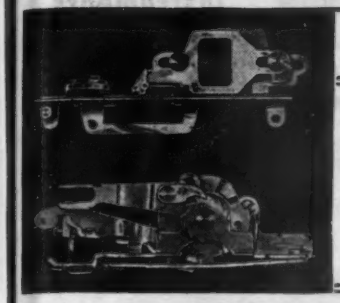
The Crankshaft is a typical example of assemblies where anti-friction bearings of the solid race-type are restricted, in that they can only be applied to the end main bearing locations. This alone would contribute nothing to the life of the mechanism. But the Split Ballbearing, with its divisible races can be easily installed in all other locations (i. e. crank pins and intermediate main bearings), thus affording maximum efficiency of performance; and incidentally creating an entirely new field of practical usefulness for solid race-type bearings, as shown. Gear clusters, accessory drive shafts, etc. can be made integral units instead of keyed or coupled assemblies.

SPLIT BALLBEARING

Send for catalog A.M.-7-45.

·DIVISIBLE RACE BEARINGS·
SPLIT BALLBEARING CORPORATION
LEBANON, NEW HAMPSHIRE, U. S. A.

CONTRACT WORK



STAMPINGS and ASSEMBLIES

We can make long or short runs in any metal. Our modern equipment and methods, backed by 50 years of experience, are your guarantee of satisfaction. Our manufacturing facilities also include screw machine products, tools, dies, jigs and fixtures.

Your order is assured of quality workmanship by skilled mechanics. We will furnish prompt quotations on your blueprints or samples. Write us today!

"Greater Savings with Greist"

THE GREIST MFG. CO. 546 Blake Street New Haven, Conn.

METAL STAMPINGS

• TOOLS • DIES •

PERMANENT MAGNETS

HEAT TREATING

THOMAS & SKINNER

STEEL PRODUCTS CO.

1103 E. 23rd St. INDIANAPOLIS, IND.

CONTRACT WORK—

We can build machines and parts, special tools and fixtures of all kinds to your specifications and design. Skilled workmen and modern equipment are your guarantee of satisfaction. The design and building of wire and ribbon stock forming machines are our specialty.

We solicit your blueprints or samples for quotation. No obligation of course.

THE A. H. NILSON MACHINE COMPANY

Bridgeport, Conn.

WIRE AND METAL SPECIALISTS

in round, flat, square and special shaped wire in all metals.

LARGE PRODUCTION CAPACITY

Plating and finishing.

EASTERN TOOL & MFG. CO.

BLOOMFIELD, N. J.

MOULD MAKERS

Specializing in molds for the Rubber Industry also facilities for automatic screw machine work up to 11/16.

M & N Machine Tool Works

146 Orono Street Clifton, N. J.

AVAILABLE SCREW CAPACITY

¼ to 4½ Automatic and Hand Screws

Including Necessary Secondary Operation

Forward Samples and Blueprints for Quotations

BRIDGEWATER SCREW PRODUCTS CO., Bridgewater, Mass.

Long runs for Turret Lathe & Milling Machines.

VAHL ENGINEERING CO.

505 Court St. Brooklyn, N. Y.

FORGING ITEMS WANTED FOR

800 lb., 1000 lb., 10,000 lb. steam drop forging hammers.

2500 lb. and 3000 lb. board drop forging hammers.

1½", 2", and 4" upsetter type forging machines.

This forging equipment supplemented by flat die steam hammers, bulldozers, presses, shears, etc.

Production machine shop for necessary machining.

Tool & die shop suitable for mfg. tools & dies required by forge & production shops. Capacity available as Navy forging contracts are completed.

Manufacturers Impression Die Forgings—Electrical and Mechanical Equipment.

COVINGTON ELECTRICAL MECHANICAL COMPANY

BOWLING GREEN KENTUCKY

SEARCHLIGHT SECTION

POSITIONS VACANT

SENIOR AND Junior Industrial Engineers, Positions now open are permanent and afford successful applicants exceptional post-war opportunities. Starting salaries are high. Qualifications: Applicants for both senior and junior positions must be graduate engineers, either in industrial, chemical or mechanical engineering. Senior engineers (ages 28-33) must have had experience in 3 or more of the following time studies, establishing standards, installing labor controls, estimating costs, installing wage incentive systems, handling methods improvement programs. Junior engineers (ages 21-27) without industrial experience will be considered. Inquiries, giving experience, marital and draft status and other pertinent information, should be directed to the Employment Manager, Union Bag & Paper Corporation, Post Office Box 570, Savannah, Georgia. Persons now engaged at highest skill in essential industry cannot be considered. Union Bag & Paper Corporation, Savannah, Ga.

DESIGN ENGINEER—Established Connecticut manufacturer needs graduate engineer or equivalent experienced in design of automatic machinery. Printing press and some tool, jig and fixture experience desired but not essential. Postwar opportunity with company whose products have international distribution. State age, marital status, education, experience, present salary and salary expected. P-352, American Machinist, 330 W. 42nd St., New York 18, N. Y.

WANTED: TWO First class model makers to construct models of light precision equipment. To the right men we offer permanent positions, good wages and reasonable working hours under the best of working conditions. Do not apply if engaged in essential war work. Location: New York City. P-353, American Machinist, 330 W. 42nd St., New York 18, N. Y.

WANTED: CHIEF Mechanical engineer for design and development of varied radio and electrical parts and equipment. Experienced in manufacturing involving small metal stamping, screw machines, general machine work and assembly. Permanent position with ample responsibility and opportunity in well established company employing over 400. Small city with attractive living conditions. E. F. Johnson Company, Waseca, Minnesota.

(Continued on page 346)

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small

MATCH PLATE WORK A SPECIALTY

Put your pattern problems up to us — we will take care of them

GENERAL PATTERN WORKS

2733 Hurk Street Cincinnati, Ohio

WANTED—WORK (PEACETIME)

ON CONTRACT BASIS TO YOUR SPECIFICATIONS

We offer a complete service for the Engineering, Development, and Manufacture of metal parts, assemblies, and machines.

Fully equipped, modern machine shop with complete production setup for all types of machine work.

Send blueprint or sample for prompt quotation without obligation.

SOUTH SHORE MACHINE & TOOL WORKS, INC.

Merrick Road Seaford, New York

BUILDERS OF SPECIAL MACHINERY TOOLS & DIES

THE SPECIALTY MACHINE TOOL & DIE CO.

923 Market St. (Rear) Wheeling, W. Va.

PRECISION FORM GRINDING

Specialists in grinding Circular and Flat FORM TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also step-grinding of Tungsten and Molybdenum Rods.

Send Prints for Quotation and Delivery

J. & S. TOOL CO.—477 Main St.—E. Orange 1, N.J.

(Makers of J.&S. Radii & Eagle Dressing Tools)

TOOLS—DIES—JIGS—FIXTURES—GAGES

Tool Engineering—(Designing)

Send us your samples or prints for quotations. Prompt and efficient service.

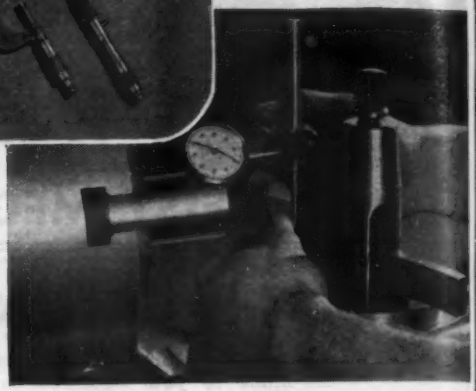
PRODUCTION TOOL COMPANY

618 Sevier Ave. Knoxville 7, Tenn.

...REBUILDING...

Lucas THE LAST WORD IN REBUILDING MACHINE TOOLS

A few precision instruments regularly used by Lucas Craftsmen



Precision Checkups . . . at every step in LUCAS Rebuilding

Precision instruments dominate the rebuilding and modernizing of machine tools in the Lucas Shops. We check for the accuracy of Lucas workmanship . . . and for the accurate performance of the completed machine tool when it is run in under power. NEW PARTS are produced and put in wherever needed. Machines may be motorized—or have their capacity increased, depending upon your requirements. Depend on Lucas 35 years of experience to give you a perfect job, guaranteed for performance and accuracy.

Send for our complete illustrated booklet—"Rebuilding the Lucas Way"

THIS is the fifth of a series telling the Story behind the Lucas nameplate on Machine Tools.

LUCAS of BRIDGEPORT

J. L. LUCAS & SON, INC. BRIDGEPORT 5, CONN.

SEARCHLIGHT SECTION

WANTED

ENGINEERS MACHINE DEVELOPMENT

Graduate engineer or equivalent, experienced in the design and development of special and experimental machines. Men with creative ability required, experienced in such lines as automatic, semi-automatic, or ordnance equipment. Must be thoroughly acquainted with modern methods and shop practices and capable of developing new ideas in conjunction with modern mechanical laboratory facilities.

State age, marital status, details of education, experience, draft status, present salary and salary expected. Enclose recent photograph or snapshot.

Post-war opportunity.

Applicants must be able to obtain Statement of Availability.

E. I. du Pont de Nemours & Company, Inc.
Personnel Division
Wilmington 98, Delaware

EMPLOYMENT SERVICE

(Continued from page 345)

SALARIED POSITIONS—This advertising service of 35 years recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details. R. W. Bixby, Inc., 366 Delaware Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

EXECUTIVE in small shop up to 1000 employees, in small town situated in Middle West, South West, or West Coast. Practical shop man thoroughly familiar with modern machine shop mass production methods ranging from blue print stage, thru processing, design, tooling, estimating, plant layout, etc. First class organizer and producer with the equivalent of a college education arrived at the hard way. Salary secondary to pleasant, harmonious surroundings. Middle aged, family man, 35 years in Detroit and Michigan. PW-342, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

PRODUCTION ENGINEER or Works Manager, 30 years of practical experience in designing and building precision tools for high production, desires permanent position with responsible manufacturer. PW-326, American Machinist, 330 W. 42nd St., New York 18, N. Y.

PRACTICAL METAL Fabricator wanted by long established mid-west manufacturer for supervising the construction of dies and fabrication of metal panels and components in small lots required for specialized motor vehicle bodies. Must have practical experience in fabrication of metal body panels on stretcher presses, drop hammers and small toggle presses. Permanent position for right man. Write giving complete resume of experience including places worked, photograph, age and salary expected. P-354, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

(Continued on page 348)

WANTED

INDUSTRIAL CONTROL ENGINEER

We are interested in securing an electrical engineer to develop industrial control apparatus.

Applicant should be familiar with competitive designs, and have working knowledge of tests and working methods, Underwriter's requirements and NEMA standards for electric motor control.

Excellent opportunity to qualify for a permanent supervisory position in Engineering Department of an expanding organization well established in the automotive electrical and magnetic relay field. In applying give age and complete resume of experience.

R-B-M MANUFACTURING CO.
Division Essex Wire Corp.
LOGANSPORT INDIANA

TOOLROOM FOREMAN

New York environment. Located in North Bergen, New Jersey. 20 minutes from Times Square, New York. Toolroom with about twenty die makers. We have excellent equipment. Applicant must have at least ten years of diversified, practical experience in the building of small progressive and precision dies. Should be thoroughly familiar with mass production of small ornamental metal articles. Age preferably 35 to 50 years. Permanent job, liberal pay with future and substantial annual bonus. References required.

P-333, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

90" Niles Wheel Lathe being Engineered Rebuilt *by Simmons for one of the country's leading railroads. In foreground, dismantled parts of a similar lathe.*

WHILE retooling for peacetime production awaits only the go-ahead signal to put your blueprinted ideas to work, don't overlook the nucleus of your future production—the overworked machine tools right on your floor, the equipment that must be restored to peak efficiency for economical and profitable operation.

Leading manufacturers are already anticipating this need, taking "physical inventory" of their basic equipment and initiating systematic *Engineered Rebuilding* programs by Simmons.

Engineered Rebuilding goes beyond the mere restoring of a tool to originally designed capacity. Simmons techniques build in new utility and labor-saving devices. Beds and tables are lengthened, housings widened, and special motors and gear transmissions added where necessary.

A new edition of "The Simmons Way" is just off the press. It will answer your questions about the ways and means of *Engineered Rebuilding.* Write for your copy today.

SIMMONS MACHINE TOOL CORPORATION
1759 NORTH BROADWAY, ALBANY 1, NEW YORK

SIMMONS MANUFACTURERS OF STANDARD AND SPECIAL-PURPOSE MACHINE TOOLS • ENGINEERED REBUILDING

POSITIONS WANTED

(Continued from page 346)

PRODUCTION AND Tool Engineer wishes to locate in the East. Sixteen years of practical experience from apprenticeship through shop supervision, cost estimating, designing, processing and management. Thoroughly familiar with up to date precision methods, tooling and equipment. Field covers such products as tools, dies, gages, jigs, fixtures, special production machinery and aircraft engines. American, age 34, available. PW-355, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EXECUTIVE—Looking for permanent position as works manager, factory manager or technical director, graduate engineer with shop and organization experience on metal fabrication and machining operations. Experience in product engineering and development; production engineering and control; industrial engineering; welding engineering; training and personnel control. PW-356, American Machinist, 330 W. 42nd St., New York 18, N. Y.

SALESMAN WANTED

SALES AND Field Engineer—Manufacturer of Pneumatic Comparator Gages offers an unusual opportunity for a man having basic knowledge of quality control and inspection procedure. Permanent addition to staff for Detroit or New England areas. Write fully—stating education, experience, and salary desired. Replies held confidential. Moore Products Co., H & Lycoming Sts., Phila. 24, Pa.

REPRESENTATIVES AVAILABLE

NATIONAL DISTRIBUTOR operating with high type dealers and sales agencies throughout the United States, can handle another quality line of machine tools or gages. Our experience is extensive and are producing successfully for two companies now. RA-357, 520 N. Michigan Ave., Chicago 11, Ill.

CANADIAN TOOL Manufacturer desires connection with American firm manufacturing affiliated lines. Purpose, to import and rough, semi-finished, or finished condition goods, for further processing and distribution throughout Canada and the British Empire. RA-358, American Machinist, 330 W. 42nd St., New York 18, N. Y.

PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N.W., Washington 5, D.C.

WANTED
SALES ENGINEER

To represent established New England grinding wheel manufacturer in Northern New Jersey and Chicago territories. Industrial sales contacts a requisite. Special consideration given applicants with grinding wheel sales experience. Salary $350.00 per month with incentive arrangement, plus expenses. All replies considered confidential. Apply Box

SW-344, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

WANTED
NATIONAL DISTRIBUTOR
FOR MACHINE TOOLS

Manufacturer of a quality line of specialized, well-advertised machine tools for machine shops now used by hundreds of America's leading companies will entertain an arrangement for exclusive distribution through an organization set up to do a national selling job.

Reply in confidence to:

RW-351, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N.Y.

WANTED
MECHANICAL ENGINEER

Must be thoroughly experienced in all gear manufacturing problems as well as designing; only those with extensive gear experience need apply. Exceptional post-war opportunity. Write full history including name of university and year graduated; names and addresses of all former employers; age; salary desired.

P-345, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

MACHINE DESIGNER

We want a machine designer for developing special machinery for the manufacture of nail files, clippers, tweezers, scissors and other manicure articles. We prefer a man who has had experience designing machinery for this industry.

If you want to join an alert organization made up of young, successful executives, tell us about your experience, listing the names of your last three employers, showing job held, when you commenced with and left the firm, and other information that will help in determining your fitness for the job. We will not correspond with your present employer unless you request, but we will make a careful investigation. If we decide to interview you for the job, your expenses to our plant will be paid.

GENERAL MANUFACTURING CO.
4204 LYNDALE AVENUE NORTH
MINNEAPOLIS 12 MINNESOTA

SHOP SUPERINTENDENT
For 200 man metal working plant

Man in his thirties with ten years' actual experience on tool and die or machine shop work. Must have executive ability to assume full responsibility to maintain quality and quantity production in a modernly equipped machine shop. Strong, "know-how-to-do-it" personality based upon actual machine tool operating experience and with ability to manage men and command the respect of those who are already skilled in the special technique required to produce a fine precision machine tool item. A part of the job is maintaining labor relations which are excellent. Permanent position with long established manufacturer willing to pay good salary to the one man who can qualify. Location, small midwestern town. State age, educational background, full details of shop experience, and salary expected. Confidential.

P-347, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

PROFESSIONAL SERVICES

Contract Termination Specialists
CONSULTANTS, ADVISORS, NEGOTIATORS
We will assume full charge of your
TERMINATED WAR CONTRACTS
Govt. Trained—Our charges included in post termination expenses.
ROBERT L. COLLUM ASSOCIATES
Room 837 11 West 42nd St., N. Y., N. Y.

WANTED
GENERAL MANAGER

Man with practical production and machine shop experience in manufacture of metal parts—Sales ability and knowledge of small factory methods desirable—Man must be young—30 to 40 years preferable—Must have vision and ambition and be willing to start with modest salary but with a working interest in this small manufacturing establishment located in Greater Chicago area and with orders on hand which will be increased in Post War period. This is an opportunity for the right person—*Write giving complete details covering your early and complete education, experience, employers, habits—references, etc. Confidential—address.*

P-350, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WANTED
PRODUCTION MANAGER

Man experienced in planning, scheduling machine loading and inventory control with experience in small lot production. Machine Shop and sheet metal experience an asset. Excellent post war prospects with an old organization in the middle West.

P-335, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

ESTIMATOR WANTED

Estimator on Dies, Tools & Production in a well-established and growing die-casting plant located on the eastern seaboard. A permanent connection with future opportunities is assured the right man. Our organization knows of this advertisement.

P-346, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

PRODUCTION MANAGER
with tool and die experience

Progressive tool manufacturing plant in small midwestern town has exceptional opportunity for technically trained man. Must be qualified by education and at least 10 years' machine shop experience. Will manage production and maintain the high quality of precision line of tools. Capable of handling labor relations. Permanent position, splendid future, for man of ability and personality who can command respect of high type workmen already in this shop. *Write details of education and shop experience, stating salary requirements.*

P-348, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WANTED
MACHINISTS
MACHINIST OPERATORS
TOOL MAKERS

Permanent full-time employment with America's leading manufacturer of oilfield equipment. Now building vital war materials but has a definite post war future. Living facilities available.

Cardwell Manufacturing Company, Inc.
Box 2001 Wichita, Kansas

Business Opportunity & Equipment Wanted Advertising on page 350

EVERY ITEM GUARANTEED AS REPRESENTED

FALK FOR DEPENDABILITY IN REBUILT MACHINERY

AUTOMATICS

6—#61 New Britain-Gridley 6 Spindle 1⅝" cap. Automatic Screw Machines. A.C. Motor Drive, Threading Spindle. New in 1943. Bargain.

1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle.

BORING MILLS

100" Niles-Bement-Pond Bor. & Turn. Mill.
48" Gisholt, vert. Boring & Turning Mill.
Horiz. #36 Landis-Rochester, 3½ Bar Floor Type—Floor Plate 72" x 120".
42" Bullard Vertical Boring Mill with side head; New Era Type.
#31 Lucas Horizontal Boring Mill, 3" bar.

DRILLING MACHINES

Bickford 4-spindle Rail Drill, #4 Morse Taper. Table 20"x67".
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Woodward & Rogers, 6 spindle.
Fosdick 13", 4 spindle (2). 2 spindle (1).

RADIAL DRILLS

3' 9" col. American, S.P.D.
3' Dreses, 10" rd. col. QCG., M.D.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
6' Arm 14" Col. Cincinnati Bickford.

MULTIPLE DRILL

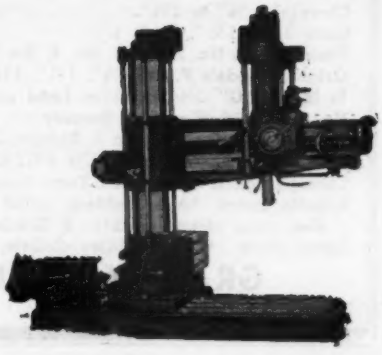
Fox #15H 54 spindle hydraulic feed.

GRINDERS

12" No. 22 Heald Rotary Surface Grinder.
16" Persons-Arter Rotary Surface Grinder.
#4 Brown & Sharpe Universal Grinder.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump. 15" swing, 5" hole, 4" dee.
Oliver Model 51 Drill Grinder; 1½" cap.
14"x36" Cincinnati, Plain, motor in base.
6"x32" Norton Cyl., overhead c/s drive.
#1 Wilmarth & Morman hand surface Grinder

Blanchard Grinder #16, 30" dia. Magnetic Chuck, 25 HP 3-60-440 V. Motor.

Pratt & Whitney Vertical Surface Grinder, 14"x36" with 10"x36" Magnetic Chuck. Ball Bearing Spindle. Perfect Condition.



Cincinnati-Bickford 5' Arm, 13" round column with air clamp. Oil grooved, tee slotted base, side base, with plain box table with #5 Morse Taper spindle. Motor drive.

LATHES

Hendey 14" x 6' Toolroom Lathe, Taper
14 x 6 Pratt & Whitney semi—Q.C.G.
16 x 8 Hendey Arranged M.D., Taper.
Lodge & Shipley 16" x 8' 12-Speed G.H.
16" Warner & Swasey Fox Brass (2).
16" Dreses Fox Brass.
20 x 10 Lodge & Shipley, G.H., M.D., Taper.
Putnam, 26 x 12 Heavy Q.C.G., arr. for M.D.
Potter & Johnston #6A Automatic Chuckers; 3½" dia. hole in spindle (2).

MILLING MACHINES

#3, #4, #5 Cinn., High Power, Plain, S.P.D.
No. 0 Bickett Vertical Bench Miller.
#1-#1½-#2 Brown & Sharpe Plain Millers.
P & W 2½" Duplex Spline Miller.
Hall Planetary Thread Miller 24".
No. 8 Lees Bradner Thread Miller.

PLANERS

120"x72"x35' Betts, 4 Heads, M.D.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x24" N.-B.-P., Planer Shaper, M.D.

POWER PRESS HEADQUARTERS

#4½ Bliss D.C. B.G. Forging 3" stroke.
#1, Bliss-"Stiles", Plain flywheel.
105-ton Waterbury-Farrel O.B.I., M.D., hi-spd, power Press, double roll feed. 1" stroke, Bed 37" R to L, 20" F to B.
#4 Erdle, Stiles type, 1½" stroke.
#35 Niagara back flywheel, geared.
#22 Wells, back flywheel. Open back.
200 ton A.C.F. Hydraulic Press. Bed 24"x 36", 4-post.
7—25 ton Model SL2 K. R. Wilson hydraulic Presses.
Beck Duplex Embossing Press.

SHAPERS AND GEAR CUTTERS

14" Rockford crank shaper.
26" Cincinnati Triple Geared, Belt Dr.
12" Schuchart & Schutte Gear Hobber.
#1 Adams Gear Hobbers, Belt driven (3).
No. 2 Baker Keyseater.

SHEARS & METAL CUTTING MACHINERY

Lennox Splitting Shear, ¾" cap.; 8' throat.
Lennox Bevel Shear, ¾" cap.
Niagara #98 Production Power Brake & Folder. 72"x14 ga. cap. Equal to new.
Bliss #232 Slitting Shear, 14 ga.
Gould & Eberhardt Slitting Shear, 10 ga.
Niagara 16 ga. x 42" Gap Foot Shear.
Niagara #9S Power Seamer.
Niagara 4" x 42" Geared Slip Roll Former.
Niagara 3" x 36" Geared Slip Roll Former.
Niagara 48" Roller Leveller. 6 Roll.
Niagara #30 Beader & Flanger.
Niagara #0 Beader.

MISCELLANEOUS

Waterbury-Farrel Cold Header, double stroke, open die, ½" cap. & 6'.

Manville Cold Header, single stroke, solid die, 3/16" cap.

J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer, portable, 25 cy. 440 volts.
Hydraulic Pumps—Hele Shaw, Racine, Oil Gear, Motor Driven.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.
No. 7B High Speed Riveting Hammer, cap. ¾" to 1½". New this year.
Standard Automatic Drop Hammer, 300#.

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY
Machinery Merchants

18 WARD ST.
ROCHESTER 5
N. Y.

WANT TO MANUFACTURE BRITISH-DEVELOPED PRODUCTS?

Manufacturing rights to a wide range of metal products may be obtained *without visiting Great Britain.* British Consulting Engineer, with office in London and extensive connections, will contact and negotiate for you. Works in conjunction with American Consultant. Surveys and reports on any engineering product or subject prepared.

BO-330, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

MANUFACTURE IN ENGLAND

Well established engineering concern located in Lancashire, England is willing to undertake the manufacture of complete engineering products previously exported to Great Britain.

This company, a member of Fedration of British Industries, has large machine shops and iron foundry, and modern engineering plant employing 350 to 400 personnel. Abundant labor supply available.

Right Concern may obtain a part or controlling interest in the business. Fullest investigation is offered to bona fide inquirers.

BO-331, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POST WAR PRODUCTS
Wanted

By manufacturer with extensive engineering, toolmaking and manufacturing facilities. We are equipped to design, redesign, engineer and produce any metal item, write

WHALEY ENGINEERING CORP.
P. O. BOX 1336 NORFOLK, VA.

WANTED

Barber-Coleman #3 Gear Hobber, Late Model in good condition. Reply to:

P. O. Box 3095 Charlotte, N. C.

WANTED

New or used Rotary Double Pointed Tack Machine, as manufactured by A. H. Nilson Machine Company or equal.

M. D. GIARDINO
101 PARK AVENUE, NEW YORK 17, N. Y.
LExington 2-9288

WANTED

WATERBURY FARREL FOUNDRY EYELET MACHINE. 6-8 or 10 PLUNGER.

Wire Collect to

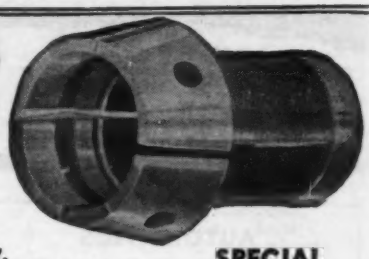
VIRJUNE MACHINE COMPANY
23 Jefferson Street Waterbury 40, Conn.

WANTED PUNCH PRESS

35 to 150 ton capacity, with or without motor drive. Must be in good condition. Write

CITY MACHINE COMPANY
868 E. Tallmadge Ave., Akron, Ohio

USED COLLETS
FEED FINGERS — PADS



ACME, No. 515, No. 52, No. 53, No. 54, No. 55, No. 56.
ACME-GRIDLEY 1⅛"
Cleveland ⅞" to 2½".
Cone 1¼", 1½", 2½", 4".
Foster No. 1, No. 2, No. 3, No. 4, No. 5, No. 7.
Gridley, Models F, ¾", ⅞", 1¼", 1⅜", 2¼", 2⅜", 3¼", 4¼".
⅞ Model "G" Gridley Form, Lead and Cut Off Cams.
No. 4 & No. 6 Warner & Swasey.
Bardons & Oliver, Brown & Sharpe, Davenport, Garvin.
LARGE STOCK OF ⅛x5 NEW BRITAINS.
Change Gears, Lead Cams, Form Cams, No. 53 to No. 56 Acme.
Spindle gears, finger holders, collet tubes, push tubes, spindles, nose pieces for 2⅛" F Gridley.
Large stock 1⅛" F. Gridley Collets.

SPECIAL
10 x 5 Browne & Sharpe Face Mill Cutters. Vertical Head for large mill.

MDNA MEMBER

GRAFF MACHINE TOOL COMPANY
7140 So. Halsted Street Vincennes 9664 Chicago 21, Ill.

SEND FOR OUR SPECIAL PRICES OF PRECISION TAPPER GROUND TAPS

High speed tapper taps, bent and straight shank. Sizes ranging 3/56 to 10/32 in 90° bent shank. Sizes ranging ¼-28 to ½-20 NF in 90° & 180° bent shank. Sizes ranging ¼-28 to ¾-16 in Acme and straight shank 15" overall. ALL GOOD STANDARD BRANDS FOR IMMEDIATE DELIVERY.

DE WITT TOOL COMPANY
173 GRAND STREET, NEW YORK 13, N. Y.
SEND US YOUR INQUIRIES

PLANER

in good operating condition, only recently removed from production line in machine tool plant.

Table length .....20'-10"
Table width .....40"
Center of table to R.H. housing.....24½"
Center of table to L.H. housing.....37½"
Top of table to cross rail.....40"

complete with 20 hp., 220v., 3 ph., 60 c. V-belt motor, jack shaft, pulleys and belts.

Reasonable offer accepted for quick removal

Cleereman Machine Tool Co.
GREEN BAY WISCONSIN

WANTED

Power Press 150 Tons, 10" Stroke, straight side, single action. Preferably single crank, double geared.

UNIQUE ART MFG. CO. INC.
200 WAVERLY AVENUE NEWARK 8, N. J.
Bigelow 3-5630

Toledo Counting & Weighing Scale Wanted
750 pound weighing capacity
100:1 and 10:1 } Counting Ratio
99:1 and 9:1 }
1800 Model series or similar

DAYTON ROGERS MFG. CO.
2835-12th Ave. S. MPLS. 7, MINN.

SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders

MDNA MEMBER

B. D. BROOKS, INC.
301 Atlantic Ave., Boston, Mass.

Reed Prentice 27"x18' Bed Quick Change Gear, 12-Speed Geared Head Engine Lathe —Taper Attachment. 10 H.P. 3/60/20 Motor with "V"Belt Drive.
Raising blocks to swing 40"

H. J. KOONTZ
PHONE 8180 MASSILLON, OHIO

FOR SALE
600 TON HYDRAULIC PRESS

Watson Stillman rebuilt 48" single daylight opening, downward double acting ram 16" dia. by 21" stroke, platen 24"x24" with clear space left to right 30¾" between 5½" dia. strain rods. We will purchase your Surplus Equipment.

UNIVERSAL HYDRAULIC MACHINERY CO.
285 Hudson Street New York, N. Y.

FOR SALE

#304 Oster Pipe machine, complete with new dies, short nipple jaws and auxiliary pipe jaws. Pipe range 1-4; bolt range ¾"-1½". Belt drive three step cone.

DENMARK MACHINE CO.
BOX 14 DENMARK, S. C.

FORGING MACHINERY

One 7" and one 8" UPSETTING AND FORGING MACHINES—LATEST TYPE
One 20,000# STEAM DROP HAMMER

FS-334, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

EASTERN OFFERS FROM STOCK

ARBOR PRESSES
15 ton Lucas High Pattern, s.p.d.
Barnes Screw Press, hand operated
King Screw Press, s.p.d.

AUTOMATICS
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
No. 6D Potter & Johnston, m.d., arr. for brake drum work
No. 22 New Britain, belt, has tapping spindle
No. 23 New Britain, belt, has tapping spindle
No. 33 New Britain, m.d., has tapping spindle
4 spindle ⅞" Cleveland Model M, m.d., bar
4 spindle 2" Cleveland Model M, m.d., bar
2¼" Cleveland Model A, m.d., bar
4 spindle 2¼" Cleveland Model K, m.d., bar
2½" Cleveland Model A, m.d.
2¼" Gridley, m.d., bar
3¼" Gridley, m.d., bar
4¼" Cleveland Model A, m.d., bar
6" Cleveland Model A, m.d., bar
14" Fay Automatic, Flanders Type, m.d.

BOLT THREADING MACHINES
No. 2J Cleveland Double End Automatic, m.d., cap. 2", Landex Head
3 spindle 1¼" Acme, cone
2 spindle 1" Landis, belt
¾" Economy Automatic, belt, Lanco Head, hopper feed

VERTICAL BORING MILLS
42" Bullard New Era, m.d., side head, p.r.t.
42" Colburn, m.d., 2 swivel heads
48" Cincinnati Rapid Production, m.d., 1 turret, 1 swivel head, p.r.t.
52" Niles, m.d., 2 swivel heads, p.r.t.
52" King, m.d., 2 swivel heads, p.r.t.
72" Colburn, m.d., 2 swivel heads, p.r.t.
72" Cincinnati Rapid Production, m.d., p.r.t.
120" Cincinnati Rapid Production, m.d., p.r.t., 2 swivel heads

HORIZONTAL BORING MILLS
No. 21 Lucas, m.d., 2½" bar
2¾" bar Sargent Floor Type, motorized, floor plate 16x4'
4" bar Detrick & Harvey Floor Type, m.d.
4" bar Lucas Table Type, m.d.
4" Niles, m.d.
4½" bar Niles, m.d.
5" bar Niles-Bement-Pond Floor Type, m.d., floor plate 12x8'
5½" bar Niles-Bement-Pond, m.d.

BROACHING MACHINES
VAS—5-42 Colonial Single Ram Hydraulic, m.d.
No. 75 H.P. LaPointe Horizontal Hydraulic, m.d., 37½ tons, 150" stroke
No. 2 LaPointe, belt
No. 2 LaPointe of Hudson, belt
No. 3 J. N. LaPointe Double Spindle, belt
No. 4 LaPointe of Hudson, gear box
New Cincinnati Mill Broach, m.d.

BALL BEARING DRILLS
14" Canedy-Otto, m.d.
Allen Bench Type, m.d.
No. ½ Avey, m.d.
No. 1 Avey Bench Type, m.d.
No. 5M—16" Fosdick H.S., m.d. on spindle, tapping
Mason Bench Type, belt
Providence Eng. Model E, s.p.d.
Taylor & Fenn, belt
Henry & Wright Class K, belt
3 spindle Barr, belt
4 spindle No. 3 Avey, m.d.
4 spindle Gardam, belt
4 spindle Kokomo, belt
6 spindle No. 3 Avey, m.d.

MULTIPLE SPINDLE DRILLS
No. 3 Baush, m.d., 15 spindles
No. 3 Baush, m.d., 12 spindles
No.11 Pratt & Whitney, belt, 10 spindles
No. 16 Fixed Center Foote-Burt, m.d.
No. 26C Fox Tapper, 50 spindles
3 spindle Rockford 12" Gang Drill
4 spindle Foote-Burt Rail Drill, m.d.
4 spindle Harrington, belt

UPRIGHT DRILLS
22" Barnes All Geared Self-Oiling
H3 Barnes Hydram, m.d.
30" Rich H.D., m.d.
32" Aurora, belt

RADIAL DRILLS
3' American Sensitive, belt
3' Dreses Plain, gear box
3' Fosdick Sensitive, belt
3½' American Triple Purpose, md.
4' American Triple Geared, m.d.
4' Cincinnati-Bickford Plain, m.d. on arm
4' Cincinnati-Bickford Plain, gear box on base, 32 speeds
4' Niles-Bement-Pond Semi-Universal, m.d.
5' American Triple Geared, m.d.
5' Carlton Plain, m.d., 13" column
5' Cincinnati-Bickford Plain, m.d.
5' Cincinnati-Bickford Plate Hole Driller, m.d.
5' Dreses Plain, m.d.
5' Prentice Plain, m.d.
6' Cincinnati-Bickford Full Universal, m.d.
6' Niles-Bement-Pond Semi-Universal, m.d.
6' Reed-Prentice Plain, m.d.
6' Western Plain, m.d.
7' Cincinnati-Bickford Plain, m.d.
8' American Triple Purpose Plain, m.d.
10' American Triple Purpose Plain, m.d., 22" column dia.

GEAR MACHINERY
3" Gleason Straight Bevel, m.d.
6" Gleason Straight Bevel, m.d.
8" Gleason Mfg. Straight Bevel, m.d.
11" Gleason Straight Bevel, m.d.
9" Pratt & Whitney Hydraulic Spur Gear Grinder, m.d.
12" Gleason Straight Bevel, m.d.
48" Cleveland Gear Hobber, m.d.
No. 3—28" Brown & Sharpe Spur Gear Cutter
No. 3—28" Cincinnati Spur Gear Cutter
No. 3—36" Brown & Sharpe Spur Gear Cutter
No. 4—36" Brown & Sharpe
No. 6—60" Brown & Sharpe
Cincinnati Gear Burnisher, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.
No. 2HS Lees-Bradner Spur & Helical Gear Grinder, m.d.
No. 13LS Fellows Gear Lapper, m.d.
No. 36B Gould & Eberhardt Spur & Bevel Gear Cutter, m.d.
No. 36S Gould & Eberhardt Spur Gear Cutter, m.d.
No. 61 Fellows Gear Shaper, belt
No. 64-S Fellows Gear Shaper, m.d.
Cross Gear Tooth Rounder, m.d.

PLAIN CYLINDRICAL GRINDERS
6x18" Landis, m.d.
6x32" Norton, m.d.
8x36" Cincinnati Saddle Type, m.d.
10x24" Landis, m.d.
10x36" Cincinnati Hydraulic, m.d., model EA, latest type
10x48" Brown & Sharpe, belt
10x48" Landis Type C. Hydraulic, m.d., latest type
10x52" Landis, m.d.
10x72" Landis, m.d.
12x36" Cincinnati, belt
12x36" Modern, belt
12x42" Landis, belt
12x48" Cincinnati Plain Self-Contained, m.d.
12x48" Modern, m.d.
12x72" No. 16 Brown & Sharpe, belt
12x96" Landis, m.d.
14x18" Cincinnati Self-Contained, m.d.
14x48" Cincinnati Self-Contained, m.d.
16x72" Landis, m.d.
16x216" Landis Type B Hydraulic, m.d., latest type
20x120" Landis Self-Contained with gap, m.d.
26x96" Landis Self-Contained, m.d.

UNIVERSAL GRINDERS
12x30" No. 2 Brown & Sharpe, belt
16x68" Landis, belt

INTERNAL GRINDERS
No. 16—22" Bryant, m.d., hydraulic, latest type
No. 24 20" Bryant Hydraulic, m.d., late type
No. 20 Bryant, belt
No. 10 Bryant, belt
No. 6 Bryant, belt
No. 72A3 Heald Sizematic, m.d.

SURFACE GRINDERS
Builders Iron Fdry. Co., m.d., with magnetic chuck
No. 33 Abrasive Vertical, m.d., with chuck
14" Pratt & Whitney Vertical, m.d., with chuck
No. 1 Fraser Lapper, m.d.
38"x38"x12' Gray Planer Type Surface, m.d.
54" Bridgeport Knife, belt
Baldwin-Tuthill Knife, size No. 76 D

CYLINDER GRINDERS
No. 55 Heald, belt
No. 55 Heald, m.d.
No. 60 Heald, belt

ENGINE LATHES
10x20" Pratt & Whitney Bench, m.d., latest type
10"x3½' South Bend Bench, m.d., metal stand, 1" collet cap., latest
14"x6' Pratt & Whitney Tool Room, cone
14"x8' Lodge & Shipley Selec. Hd., m.d.
16"x6' Lodge & Shipley, cone
20"x8' American Geared Head, m.d., taper
20"x8' Lodge & Shipley Selective Head, m.d.
20"x8'6" centers Springfield Geared Head, m.d.
22"x16' centers (22' bed) American 100 H.P. Input Super Lathe, m.d.
24"x30' Schumacher-Boye, cone
26"x12' Schumacher-Boye, cone
27"x18' LeBlond Geared Head, m.d.
27"x16' LeBlond, cone, taper
30"x12'6" Niles-Bement-Pond Geared Head, m.d., taper
30"x13'6" Niles-Bement-Pond Geared Head, m.d.
30"x18' American Geared Head, m.d.
30"x26' Lodge & Shipley Selective Head, m.d.
30"x28' bed (20' centers) Niles Time Saver, m.d. 12 speed head, p.r.t., lathest type
36"x10' Putnam, motorized
36"x12' Wright, cone
36"x20' American Geared Head, m.d.
36"x14' Boye & Emmes, cone
36"x24' American Geared Head, m.d.
36"x28'6" (20' centers) Niles Heavy Duty, m.d., 24 speed head, p.r.t., taper attachment, latest type
36"x28'6" Niles same as above, except no taper
36"x36'6" (28' centers) Niles Heavy Duty, m.d., 24 speed head, p.r.t., 2 carriages, latest type
42"x26' American Geared Head, m.d., p.r.t.

MANUFACTURING LATHES
No. 9 Heavy LeBlond Multi-Cut, m.d.
3½x36" centers LoSwing, s.p.d.
3x80" LoSwing, sp.d.
8x84" LoSwing, m.d., 2 carriages
Diamond Speed Lathe, m.d.
11"x28" centers Reed Speed Lathe, m.d.
13x24" Coulter Auto. Threading Lathe, m.d.
13x96" centers Automatic Threading Lathe, m.d.
15"x6' Automatic Threading Late, cone
17"x124" centers LeBlond Rapid Production, m.d. in base, latest type
20"x8' LeBlond Mfg. Lathe, m.d.
20"x16' American Geared Head, arranged for spindle boring
No. 5 Niles-Bement-Pond Center Driving Car Wheel Lathe, m.d., brand new
No. 5 Niles as above, used
Niles-Bement-Pond Quartering Machine, new

More than 1,000 machines in stock for immediate shipment

***Main Office and Plant*—Cincinnati—Telephone Melrose 1241**
***New York Branch*—Chrysler Bldg.—Telephone MUrray Hill 4-4246**

THE EASTERN MACHINERY CO.

1004 TENNESSEE AVE. **CINCINNATI 29, OHIO**

CLOSEOUTS

BORING MILLS
HORIZONTAL

2½", 4" Binsee
4" Landis Horiz., Floor Type, M.D.

VERTICAL

66", 120" Niles
42" Bullard, M.D., 54" Colburn, M.D., 2 hds.

TURRET LATHES

24" Gisholt, 6½" hole
Foster Nos. 4, 5, 6, 1B, M.D. Univ.
J. & L. 2¼x24", 3¼x36"
Acme 3¼" M.D.

GRINDERS

P. & W. 14", 18", B.B., Vert., M.D.
Blanchard 30", M.D.; Modern 12x48", M.D.
Norton Hydraulic 12x18", M.D.
Heald Nos. 55, 70, 72A3 Gagematic, M.D.
Norton 50"x28', M.D.
Gardner 72' disc, M.D.
Landis Type A 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.
Nos. 50, 55, 60 Heald Int. Hydraulic, M.D.
12" Heald Rotary, M.D.
B. & S. No. 2 Surface, M.D.
Norton 10x36" Hydraulic, M.D.
Badger 24" Dbl. Opposed, M.D.
B. & S. No. 10, 11 Cyl.
No. 2 Cincinnati, Centerless, M.D.
B. & S. No. 1, 3 Universal

LATHES

McCabe 26-42"x14'
24x12' Boye & Emmes 3 step cone, B.D.G.
20"x14' Rahn-Larmon, raised to 24"
14x6' Hendey
9" LeBlond Automatic
36x30' Putnam, M.D.
36x22' Putnam S.C.G., D.C.M.D.
32"x35' Wickes
Putnam 42x16', M.D.
30x26' L. & S. 12 speed M. D.
P. & W. 1x18, 1¼x18 Automatic Lathes

AUTOMATICS

B. & S. No. 2, 6, 6F Hand Screw
B. & S. No. 00, 0, 2, OG
5 Spdle Davenport 9/16" cap.
Cleveland Model A ½", ⅝", 1¼", 2"
Cleveland Model B 1", 2"
P. & J. 6A, M.D.
⅞" Cone 4 spindle
Gridley ⅞" 4 spindle

GEAR CUTTERS

No. 2, 12 Barber-Colman Gear Hobber
B. & S. No. 3-26", 4-36"
Gleason 11" Bevel
G. & E. 60" gear cutter

SHAPERS

24" P. & J.
16", 20", 26", Stockbridge
20", 24" G. & E., M.D.

RADIALS

3', 4', 5', 6', 7', 8' American Triple Purpose
3', 3½', 4', 5' Cincinnati-Bickford
4' Mueller, M.D.; 4', 5' Western, S.P.D.

MILLING MACHINES

10" P. & W. Auto.
No. 3S Cincinnati, S.P.D. rapid trav., M.D.
Nos. 1Y, 0Y, 3, 4, 5 B & S Plain & Univ.
B. & S. Nos. 12, 13, 13B
Hall Planetary Model D Thread Miller
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 12, 30 Profiler, M.D.
No. 4 B. & S. Universal
K. & T., B. & S. No. 2, 3 Dbl. overarm
B. & S. No. 2, 3, Vert.
Milwaukee No. 2½B Vert.
Kempsmith No. 1 Univ.

MISCELLANEOUS

10'x¾" Niagara Power Squaring Shear 18" Gap, M.D.
Gorton No. 1S Engraving Machine
6 spindle Avey Drill, 15" overhang
McCabe ½" Flanger
Rochester No. 5B Hammer
Baker 22 Keyseater 5 P.D.
Pels 6" Vert. Shaper
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
27 Burr Keyseater
10' Erie Shear ¼" cap.
Natco No. 13 Multiple Spindle Drill
48" Southwest gate shear ½" capacity 24" gap.
8'x¼" cap. Kling Bending Rolls
6' Hilles & Jones Roll

AARON MACHINERY CO.

MONA MEMBER

45 Crosby St.
New York 12, N. Y.

QUALITY TOOLS

AUTOMATICS

⅞" and 2" Cleveland Model B
1⅝" New Britain 6 spindle
4½" Gridley 4-spindle Model H
No. 454 New Britain, 4-spindle chucking
6"x6¾" Goss & DeLeeuw 4 spdl. chucking
14"x19" Fay automatic lathe
13" Sundstrand automatic lathe
Gisholt Simplimatic

BROACHES

No. 1 Foote Burt hydraulic surface
Twin 10 Oilgear hydraulic
No. 25 Oilgear hydraulic
No. 3 Lapointe double screw
No. 2 Standard screw press

DRILLS

Sensitive, all makes and types
21" Canedy Otto (New)
20", 21" & 24" Cincinnati upright
20" Barnes box Column mfg.
22" Barnes 2-spindle, all grd., self oiling
4' Western radial, Timken bearing, M.D.

GEAR CUTTERS

No. 12 Barber-Colman hobbers
No. 12 Bar. Col. long bed splining
Nos. 7 and 21 Fellows shapers
No. 16HB Gould & Eberhardt hobbers
No. 1 Lees Bradner hobbers
64"x20" G & E spur gear cutter
26"x6" G & E spur gear cutter
No. 36 BM Gould Eber. 3 spdl. bevel
11" Gleason straight bevel, segments & Gears
15" Gleason spiral bevel pinion and gear roughers
18" Gleason bevel testers and lappers
8" Red Ring spur gear lapper
Cimatool "Peerless" gear chamferers
Lipe 2-spindle gear chamferer

GRINDERS

No. 2 Cincinnati centerless
No. 72A3 Heald Sizematic
No. 1 G Gronby internal
No. 75 Heald internal
Heald No. 72 automatic electric sizing internal
12"x36", 16"x36" & 16"x72" Landis
6"x20", No. 10 & 6"x32" No. 11 B.&S.
Nos. 1 & 2 Brown & Sharpe universal
10"x18", 10"x36" & 10"x50" Norton
18", No. 6 Besly opposed disc
20" Gardner semi-automatic disc grinder
Ingersoll face milling cutter grinder, type EN85
Cincinnati face milling cutter grinder
Gisholt tool grinder
16"x32" & 16"x72" Landis crankpin
No. 10 Blanchard surface
No. 1½ Cincinnati tool & cutter

FORGING EQUIPMENT

No. 2B Nazel air hammer, motor driven
No. 1 Evans Ajax taper forging roll
3" Acme upsetter (forging machine)

LATHES

12"x8' Sebastian
14"x6' Mulliner
15"x6' Sebastian
18"x8' Boye & Emmes
24"x12' Boye & Emmes
28", No. 3B Fester turret
28" Gisholt turret
8" and 12" Sundstrand Stub
15" Sundstrand automatic stub
14"x18" Monarch Magnamatic
9"x12" Sundstrand grd. hd. Mfg.

MILLERS & BORING MILLS

2½" Universal horizontal mill
3½" bar Universal horizontal mill
4½" bar Universal No. 44 Triway horizontal mill
5" Barret cylinder borer
No. 3-B Milwaukee vertical miller
No. 3 Reed Prentice vert. miller & die sinker
No. 2 Cincinnati plain
No. 4—36 Cincinnati Hydromatic
No. 3 Sundstrand bed type mfg. miller
48" Oesterlein tilted offset miller
30" & 42" Ingersoll continuous rotary
Type C Hall planetary thread miller
48" Newton C66A cont. rotary
No. 4 Lees Bradner univ. thread
4" Rice Barton double spline
No. 6 Whitney hand mill

SEND FOR COMPLETE LIST

MILES MACHINERY CO.
SAGINAW, MICHIGAN

MOREY
Dependable Used Machines

BORING MILLS—VERT.

BULLARD 24"—M.D.
GISHOLT 42"—2 head

DRILLS—RADIAL

AMERICAN 3' Triple Purpose—motor on arm
CINCINNATI BICKFORD 3½'

GEAR GENERATORS

GLEASON 3" and 6"—Straight
GLEASON 10" and 15"—Spiral
GLEASON 12"—Straight

GRINDERS

NORTON 24"x240" Plain
ARTER 8" Rotary Surf.
ARTER Auto. Piston Ring
UNIVERSAL Hyd. Spline Shaft

LATHES

LODGE & SHIPLEY 30"x26'—2 carriages
MOREY #3 Univ. Turret—1½" cap.
WARNER & SWASEY #3A Univ. Turret

MILLERS

BROWN & SHARPE #3A Univ.
KEARNEY & TRECKER #3B Univ.
CINCINNATI #3 Vert.
BROWN & SHARPE #3 VERT.
MOREY #12M—2 spindle Vert. Miller and Profiler
MOREY 12" x 60" Thread Miller
RICE BARTON 4" Duplex Spline Miller

PLANERS

GRAY 24"x24"x6'—1 head
CINCINNATI 36"x36"x10'—4 heads
GRAY 72"x48"x12'—2 heads
WOODWARD & POWELL 60"x60"x20'—4 head

SHAPERS—HORIZ. and VERT.

MOREY 8" and 12" Vert.
PRATT & WHITNEY 6" and 10" vert.
MORTON 30" Draw Cut—Horiz.

MISCELLANEOUS

DILL 18" Slotter
ESPEN LUCAS #138 Cold Saw—12" cap.
SAUNDERS 8-16" Pipe Machine
TREADWELL 12" Pipe Machine

MOREY
MACHINERY CO., Inc.
410 BROOME ST., NEW YORK

Bullard Multi-Matic Type "D" 16", 6-spdl., 12" high column, new 1941

6" x 30" Norton Type "C" Hydraulic Plain Cylindrical Grinder, new 1941

8" x 48" Jones & Lamson Universal Thread Grinder, new 1940

12" Gleason Straight Bevel Gear Generator, new 1939

Model H-2 Micromatic Hydrohoner, new.

54" x 34' Houston, Stanwood & Gamble Engine Lathe, two carriages, two Taper Attachments, 30 hp motor.

All latest type machines.

Many more. Send us your inquiries.

HAZARD BROWNELL
Machine Tools
350 Waterman St., Providence 6, R.I.
Dexter 8880

IN STOCK

LATHES

46"x20' b.c. Niles, 2 carriages, G.H., M.D.
48"x26' Putnam, G.H., M.D.
48"x24' Blocked to 80" Fifield, D.B.G.
42"x20' Lodge & Shipley, M.D.
36"x16' Niles-Bement-Pond, Q.C. G.H. M.D. Taper
2—36"x14' Niles-Bement-Pond, Q.C. G.H. M.D. Taper
36"x14' Niles-Bement-Pont, Cone, B.G. M.D.
30"x17' Blocked to 58" Houston, Q.C. M.D. B.G. Grind. Attach.
24"x12' Putnam
24"x12' bet. centers Rahn & Larmon
14"x6' Reed Prentice Tool Room, M.D.
24"x10' Flather, Q.C. B.G. M.D.
20" Multi-Cut Leblond, G.H. Taper
2—18"x10' American, G.H. M.D.
3—18"x8' Springfield, Q.C. D.B.G. Taper
16"x6' Monarch, Q.C.G. M.D.
14"x6' Pratt & Whitney
14"x6' American, Q.C.G. M.D.

TURRET LATHES

4½" Bardons & Oliver, Bar Feed, M.D.
4"x34" Jones & Lamson, M.D. 1930 model
3"x36" Jones & Lamson, G.H.
1½" & 2½" Pratt & Whitney
#2 Warner & Swasey, M.D.
#1B Foster Universal, M.D.
1" Foster, M.D.
#3 Warner & Swasey, hand, 1¼" Cap.
2—3½" Acme, M.D.

BORING MILLS

10' Betts Vert. M.D. P.R.T.
8' Niles Vert. M.D. P.R.T.
42" Bullard, Vert. New Era
36" Bullard, Vert. New Era
24" Bullard, Vert. Rapid Prod.
3" Universal, Horiz.

RADIAL DRILLS

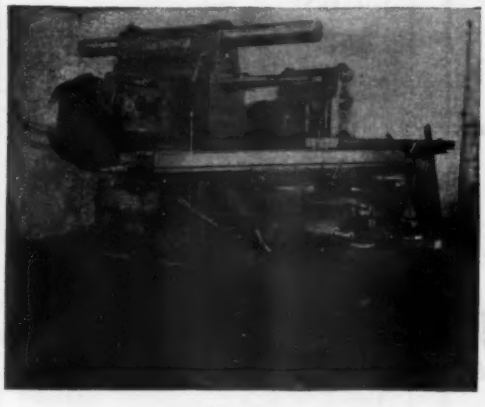
6' Cincinnati-Bickford, 15" Col. S.P.D.
5' Cincinnati-Bickford, 13" Col. S.P.D.
5' Morris, 13" Col. M.D.
3' Bickford, 9" Col. S.P.D.

3000 Ton R. D. Wood Hydraulic

#1½ Cincinnati, Plain
#25 & #26 Beckers, Plain (see photo)
#5 Cincinnati Hi Power Universal, S.P.D.
2—#4 Cincinnati Universal, S.P.D. (see photo)
#3 Cincinnati Universal, S.P.D.
#3A Brown & Sharpe Univ., S.P.D.
#3 Cincinnati Vertical, S.P.D.
#08 Cincinnati Vertical
#2 Brown & Sharpe Vertical, M.D.
Model C Becker Vertical, Rotary table, M.D.
Model AB Becker Vertical, S.P.D.
12"x48" Pratt & Whitney Thread Miller
#12 Brown & Sharpe Production, Arr., M.D.

SHAPERS

24" Potter & Johnston, M.D.
24" Gould & Eberhardt, M.D.
20" Steptoe, M.D.
20" Stockbridge, M.D.



AUTOMATICS

#00, #0, #2 Brown & Sharpe
1¾" Gridley, M.D.
6—1⅜" New Britain, Late type
⅝", 1", 1⅝" New Britain, 6 Sp., M.D.
⅝"-⅞"x7" Cleveland, Single Sp.
3" Cleveland, Single Sp.
#52, #53, #55 National Acmes
3/8", 1/16", ½" Ceco, Gorton (Swiss)
3" Gridley, Single Spindle
4" Cleveland, Single Spindle

PLANERS

72"x72"x26' Sellers, 4 heads, M.D.
42"x42"x12' Cincinnati, 3 heads, M.D.
42"x42"x10' Gray, 4 heads, M.D.
30"x30"x 8' Pond, 2 heads, M.D.
24"x24"x 6' Bullard, 1 head, M.D.

MILLERS

36"x36"x10' Ingersoll, Planer type, 4 Heads, M.D.
#4 Cincinnati Plain, 3 step, D.B.G. M.D.
#4B Brown & Sharpe, S.P.D. M.D.
#4 Milwaukee, Plain, M.D.
#3-K Milwaukee, Plain, M.D., 1939 model
#2 Garvin, Plain

HAMMERS, PRESSES & OTHER FORGING EQUIPMENT

4" Ajax Horizontal Upsetters
2—R. D. Wood Hydraulic Forging Presses, 2500 & 3000 tons
2—Watson-Stillman Hydraulic, 600 and 1000 tons
Farnham Hydraulic, 250 tons, 4 post., 4" dia.
6—Steam Drop Hammers, 100#, 500#, 600#, 1100#, 1500#, 3800#, 2000# Steam Hammer
#57 & #58 Toledo Geared Trimming Presses
#73½ Bliss Geared Trimming Press, Flywheel type
DD55—75 ton Ferracute Blanking & Cupping Double Action Press, 1930 machine
50 ton Bulldozer, Double Action
R. D. Wood Accumulator 32" dia. x 18" stroke, 600 gal. cap.
#2 Waterbury Header
#60¼ Toledo Power Press, 1200 ton, 22" stroke. 75 HP motor (see photo)
#1, #1½, #1½B Bliss Presses
42" Hillers & Jones Metal Straightening Machine
Miscellaneous smaller presses in stock
2—#174 Bliss Punch Presses
2—Hayden & Osborne Presses, Double Crank

GRINDERS

#2 Brown & Sharpe Universal
#13 Brown & Sharpe Universal & Tool
#4 Gallmeyer & Livingston Universal Tool & Cutter, M.D.
#2 Cincinnati Univ. Tool Grinder, M.D.
#1½ Cincinnati Univ. Tool Grinder
#70 Heald Internal, M.D.
1—#1G Abrasive Internal, Bench typ, M.D.
9" Heald Rotary Surface, M.D.
1—#2 Brown & Sharpe Surface, M.D.
20"x60" table Pratt & Whitney Vert., Surface, M.D., Mag. Chuck
21½"x50½" work. surf., of table-Springfield Vert., S.P., M.D.
8' Bridgeport Knife Grinder
#1½ Landis Univ. Cylindrical
#10 Brown & Sharpe Cylindrical, M.D.

PUNCH & SHEARS

Adlerhurst Punch & Shear, 1"x6", 25" throat
#20 Pels Punch & Shear, M.D.
Pels Punch & Shear on wheels, Throat 8"
#2 Bethlehem Circular Power, gap 30"
10' Geo. A. Ohl Shear, 10 gauge
8' Niagara Power—14 gauge, 20" gap
2—8' Stohl Power Squaring—14 gauge

MISCELLANEOUS

New, #510 Campbell Abrasive Cutters, 10"x12'
¼"x12'6" Griswold Brake
10'—14 gauge Dreis & Krump Brake
8'—16 gauge Robinson Power Press Brake
#12 Pratt & Whitney Profiler
Bliss & Rafter Forming Rolls
30 & 50 KW Spot Welders
E-3 Keller Auto. Die Sinking Machine
Barnes Honing & Rifling Machines.

THIS IS A PARTIAL LIST.

COMPLETE PLANTS FOR SALE OR INSTALLED.
Terms arranged.

S & S MACHINERY COMPANY

207 CENTRE STREET **NEW YORK 13, N. Y.**

LOOK . . . at this List

of USED MACHINE TOOLS!

OUTSTANDING VALUES AT REDUCED PRICES

INTERNAL GRINDERS

No. 12 Greenfield Hydromatic—Motor Drive 3-60-220-440.

Swing ..... 15"

Grind hole up to..... 5"

Depth ..... 4"

Ball bearing—work head. Spindle Speed three—214, 333, 572 R.P.M. Condition—Excellent.

The Grinder featured was used very little and may be considered equal to a new one.

$15 BRYANT AUTOMATIC FEED MOTOR DR.

$10 BRYANT AUTOMATIC FEED BELT DR.

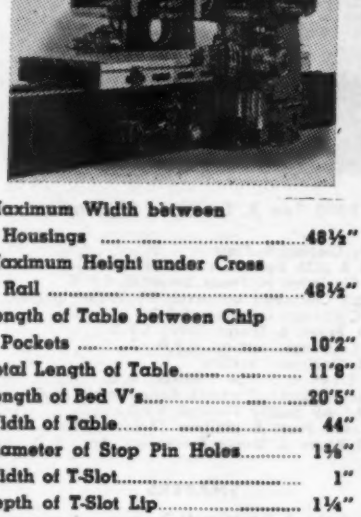
SCREW CUTTING LATHES IN STOCK

Sizes ranging from 14x6 to 20x10. Geared head, and quick change gear.

Reasonably priced. Send us your inquiry.

3 HEAD GRAY PLANER

Heavy Duty Double Housing 48"x48"x10'



Maximum Width between Housings ..... 48½"

Maximum Height under Cross Rail ..... 48½"

Length of Table between Chip Pockets ..... 10'2"

Total Length of Table..... 11'8"

Length of Bed V's..... 20'5"

Width of Table..... 44"

Diameter of Stop Pin Holes..... 1⅜"

Width of T-Slot..... 1"

Depth of T-Slot Lip..... 1¼"

Length of Down Feed of Rail Head 18½"

TURRET LATHES

3¼"x36" CINCINNATI ACME GEARED HEAD MOTOR DR.

J. & L. 3x36 geared feed with turret tools, including 3-jaw Universal Chuck.

1½" W. & S. for bar work. Belt drive. Price $325.

No. 3 W. & S. for bar work. Belt drive. Price $250.

When you think of good used machine tools, think of

MARKS MACHINE TOOL CORPORATION

WORCESTER 8, MASS. **PHONE 6-5736**

Ready For Shipment

AUTOMATICS:

B & S #00, #0 & #2
Gridley 3¼", 4¼" 1 sp.
Potter & Johnston #6C Chuckers
Goss & Deleeuw Chucker

BORING MILLS:

Cleveland 2½" Bar Heriz.
Bullard 30" Vert. Turret
Bertram 42" Vertical
Bullard 100"—2 Head—M.D.

DRILLS:

N-B-P 5' & 6' & 7' Radial, Motor on Arm
Niles 7' Radial
Cincinnati-Bickford 6' Radial
Pratt & Whitney Gun Barrel Drills & Rifflers

GEAR CUTTERS:

Brown & Sharpe #3—20"
Fellows #64
Fellows Gear Burnisher
Gleason 6" Generator

GRINDERS:

Baxter D. Whitney #23 Cylinder Grinder, Like New
Brown & Sharpe #11 Plain
Gronby Internal
Heald #70-A Internal
Heald #72-A-3 Sizematic, New 1940
G & L #5 Surface
Blanchard #16-20" M.D.
Norton 15"x15"x72" Surface
Sav-Way Internal
Brown & Sharpe #3 Univ.
Bath 10"x25" Univ.
Cincinnati 12"x36" Univ.
Landis 20"x120", 20"x144" Plain Grinders
Cincinnati #1½ Tool & Cutter
Norton #2 Tool & Cutter
Pfauter Hob Grinder
Bryant #3B, 6, 12, 18 Internal
P & W 14" B.B. Vert. Surface, Model B
Farrel Roll Grinder

LATHES:

Monarch 14"x6'
LeBlond 14x6'
Sidney 17"x8'
Lodge & Shipley 20"x8'—G.H.
Johnson 30"x24'
J & L 2¼ x 24 & 3 x 36 Turret
B & O 3" Cap. G.H.

MILLERS:

Cincinnati #0-8 Plain
Sundstrand #3, New 1940
Milwaukee Simplex
Briggs Hydraulic, New 1941
Sundstrand #1—18" Rigidmil, New 1938
Cincinnati #5 Plain SPD
LeBlond #3GH—Plain
Rice-Barton Spline Millers
Becker #4B Vertical
Cincinnati #3, #4 Vertical SPD
B&S #3 Vertical SPD
Becker Model C, Vert.
Waltham Bench Thread Miller
Rowbottom Cam Miller
P & W 5", 12" Automatic
Pratt & Whitney 2" Spline Duplex
Cincinnati 12" B.G. Mfg. Becker #7H Lincoln

MISCELLANEOUS:

Boring Machine—Coulter Diamond Borer
Chambering Machine—Pratt & Whitney
Chucking Machines—Potter & Johnston #6-C
Header—W-F ¾" Ball
Header—W-F #1 & #2—SSSD
Shaper—P & W 6" Vertical
Shear—Marshalltown #88 Rotary Bevel, M.D.
Tapper—Threadnut #2
Threader—Manville #3 Auto. Duplex Bolt Thread Cutting machine, Hopper Feed, M.D.
Swager—Dayton #3½
Upsetter—Acme 2" Steel

PLANERS:

Cincinnati 48"x48"x20', 3 Head
Gray 84"x72"x18', 4 Head

PRESSES:

W-F 20 Ton Rack & Pinion
Robertson 170 Ton Hyd. 16' High

BOTWINIK BROTHERS, INC.

373 Welton St., New Haven 9, Conn.

MISCELLANEOUS MACHINES

1—56"x56"x18' Cinci. Dbl. Housing Planer with 3 hds., box table, auto. oiled D.C. vari. speed m.d.

1—6' Niles Pl. Radial Drill, rebuilt, gear box, A.C. m.d.

1—#2½ American 2-spdl. Wood Shaper

1—#1 New Beach Comb. Rip and Cut-off Saw

STRONG, CARLISLE & HAMMOND CO.

1392 West Third St., Cleveland 13, Ohio

BRANCH OFFICE

Beard at Chatfield, Detroit 9, Michigan

RADIALS

3', 4', 5', 6', 7', 8'

AMERICAN TRIPLE PURPOSE

AARON MACHINERY CO.
45 CROSBY STREET NEW YORK, N.Y.

HILL-CLARKE

Modernized

CYLINDRICAL GRINDERS *for* SUPER-GRINDING *and* MICRO-FINISH

SIZES AVAILABLE

10x24	14x36	16x50
10x36	14x50	16x72
10x50	14x72	18x96
10x72	14x96	18x120
10x96	16x36	

Hill-Clarke Modernized and Motorized Cylindrical Grinders offer refinements in design which minimize vibration and assure extreme accuracy on all grinding operations. One of these refinements, the Hill-Clarke patented Multiple V-belt Drive to work spindle, contributes to the smoothness in operation which makes possible a finish within a few micro-inches even when using standard grain free-cutting wheels.

Send for a copy of our catalog "Super Grinding."

HILL-CLARKE MACHINERY CO. CHICAGO U.S.A.

Have you any NORTON grinders you wish modernized and motorized?

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BOULEVARD **CHICAGO 6, ILL.**

OTT MACHINERY SPECIALS

AUTOMATICS, Acme 9/16" & 1⅝" Model C 5 spdle.
AUTOMATICS, Acme 2 & 3" Model B 4 spdle.
AUTOMATICS, Gridley, 9/16", ⅞ & 1⅛" Mod. G.
AUTOMATICS, Cone, 1¼ & 1½" 4 spindle, M.D.
AUTOMATICS, Gridley, ¾, 1¼, 1⅝, 2¼" & 2⅝" Model F, M.D.
AUTOMATICS, Gridley, 2¼, 3¼, & 5⅛" S. S.
AUTOMATICS, Cleveland 1¼, 1½, 2, 3½ & 4¾" Model A, M.D.
AUTOMATICS, Cleveland, ⅞, 1¼, & 2" Mod. B
AUTOMATICS, New Britain #22 and 24 Chuckers
AUTOMATICS, New Britain, ⅝x3¾" & 1x5" M.D., Bar Eqpt.
AUTOMATICS, Potter & Johnston #5a & 6a, M.D.
BORING MILLS, 30" Bullard, M.D.
BORING MILLS, Rockford, 3¼" bar, Horizontal, 24x72" table, M.D. & 2½" Cleveland
DRILLS, High Speed, B. B. 1 to 6 spindles
GEAR HOBBERS, 12 Barber-Colman, M.D.
GEAR SHAPERS, #7 High Speed, M.D. & #6
GENERATOR, Gleason Spiral Bevel Gear, 10", M.D.
GRINDER, Brown & Sharpe #11 Plain, M.D.
GRINDER, Heald #72 Hyd. 2 m.d.
GRINDERS, Bryant #3, 6 & 18 Internal, M.D.
GRINDERS, Rivett #103 Internal, M.D.
GRINDERS, Diamond Surface #2, M.D.
GRINDERS, Landis Hydraulic, 6x18" M.D.
GRINDERS, Pratt & Whitney, 12" Vertical Surface, M.D., 9x31" Magnetic Chuck
LATHES, American 14x6' & 20"x8', M.D.
LATHES, Lodge & S. 20"x10' Q.C. M.D.
MILLING MACHINES, #2 B Hvy. B&S Plain
MILLING MACHINES, #2 B Rockford Universal
MILLING MACHINES, Becker Vertical #5 & 6
PLANER, Ohio 42"x42"x12' One Head, M.D.
PLANER-SHAPER, 30" Cincinnati, M.D.

OTT MACHINERY SALES, INC.
542 Second Avenue
Detroit 26, Mich.

MDNA MEMBER

FOR SALE

200 H.P. Hor. 4 Pl. Motor Driven Pump, Capacity 78 G.P.M. 4000#
2300 Volt Synchronous Motor 3 Phase 60 Cycle
ALSO—75 H.P. Hor. 4 Pl. Pump—50 G.P.M.—2000#
50 H.P. Vert. Triplex Pump—24 G.P.M.—2500#
200 H.P. Horizontal 4 Pl. Pump—200 G.P.M.—1500#.
18" x 15' Accumulator 1500#.
500 ton down moving ram hydraulic press 42" stroke, 28" between rods.

ACCUMULATORS, PRESSES, VALVES, ETC.
Specialists in Hydraulic Equipment
MDNA MEMBER
AARON MACHINERY CO., 45 Crosby St., New York, N. Y.

FORGING EQUIPMENT

7" Ajax Upsetting Forging Machine
1500# Chambersburg Forging Hammer and No. 12 Erie Trimming Press
3000# Chambersburg Steam Drop Hammer

IRON & STEEL PRODUCTS, INC.
13498 S. Brainard Ave. Chicago 33, Illinois
***"ANYTHING* containing IRON or STEEL"**

Boring Mills, 36"-42"-52"-72"-96".
Bolt Cutters 1"-1½"-2"-2½" Acme-Landis.
Miller Vertical, #3 B. & S., S.P.D.
Press, Forging 1000 Ton United, St.-Hyd.
Planer, 36"x36"x12' Powell 4 Hds.
Profiler, #13 P. & W., B.D.
Shaper, 20"-24"-32".
Shaper, 36" Morton, Draw Cut
Straightener, Sheet 42" W-F M.D.

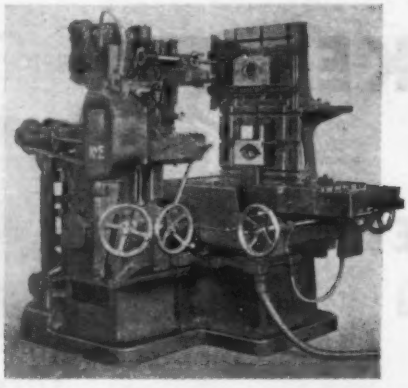
West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

UNUSUAL MACHINE TOOLS

MODEL 4-36 CINCINNATI Hydro-Matic Milling Machine, almost new. Latest style, few years old. Hydraulic table travel, 36". Infinite feeds. Complete with standard equipment, arbor, motor, controls, etc.

•

ALSO: #2 and #3 Cincinnati and Kearney & Trecker Plain and Vertical Milling Machines. One PRACTICALLY NEW #20 MB Smalley General Thread Miller. Ask for our STOCK LIST of Latest Style Machine Tools.



Model BL2416 Keller (Pratt & Whitney) Tracer Controlled Die Sinking and Profiling Machine, almost new, few years old. As illustrated, however, EQUIPPED WITH 3-SPINDLE GEARED HEAD. Horizontal travel, 24". Vertical travel, 16". Cross travel, 8". Complete with all electrical controls, motors, etc. IMMEDIATE DELIVERY.

Your Dependable Dealers

LAURENS BROS.
MACHINE TOOLS
2780 Highland Ave., Norwood, Cincinnati 12, O.

4" Bar Lucas Horizontal Boring Mill, M.D.
5" Bar Newark Horizontal Boring Mill, 8' Bed, M.D., $2250.00
16x96 Landis External Grinder, self contained
#17 Barber Colman Heavy Duty Gear Hobber, can take a hob up to 5¾" dia., M.D., $4800.00
16" 8-sp. Bullard Mult-Au-Matics, 2 yrs. old
8" Bullard Mult-Au-Matic, 12 spindle
#40 Cross Gear Tooth Rounder, M.D.
#3, #4 Horiz. and Univ. Milling Machines, M.D., $1750.00 & $2500.00
4—#4½ Bliss Presses, brand new, 100 ton cap.

PAUL'S MOTOR AND MACHINERY SUPPLY CO.
MONA MEMBER
6111 Vermont Ave.
Detroit 8, Mich.
Tyler 76300

UNUSUAL VALUES

Blueprint machine—3 pieces
Brake, Robinson 5' toggle
Drill, high speed 7' over hang single spindle
Drill, two-spindle sensitive, #1 Morse taper
Drill, 4-spindle sensitive
Gear cutter, Brown & Sharpe #3—26
Gear cutter, Gould & Eberhardt 42"
Grinder, Webster and Perks #1-¾ motor drive.
Hammer, 50# Bradley upright helve.
Two 18"x8' Mueller lathes, H.S. quick change gear
One 16"x6' Hendey Lathe.
Pipe Machine, 8" Oster motor drive
Planer 24"x24"x6' Pease, motor drive
Three blue printing machines.
Punch & Shear two ½" & ⅝" capacity
Shaper 24" Gould & Eberhardt
Threading Machine #0 Webster & Perks
Tool Grinder Sellers new #0, #1 and #2 magic chuck and collets

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

6' American Plain Radial Drill, M.D.
#3 Cincinnati Vertical Milling Machine H.P.
38"-44" Niles-Bement-Pond Vertical Boring Mill M.D.

HEAVY DUTY MACHINE TOOLS

52" Bullard Vertical Boring & Turning Mill.
6' Cincinnati Bickford Plain Radial Drill.
7' Cincinnati Bickford Plain Radial Drill.
7' American Triple Purpose, Motor on arm.
27" x 16' Lodge & Shipley Grd. Hd. Tapers.
30" x 14' Schumacher & Boye Lathe, Q.C.
10' Cincinnati Heavy Duty Boring Mill, M.D.
12' Niles-Bement-Pond Heavy Duty Boring Mill, M.D.

GRINDERS

12"x96" Landis Plain, S.C.
18"x85" Landis Plain Self contained.
#78 Covel Hanchett Surface.

GEAR MACHINERY

18" Gleason Bevel Gear Generators.
6" Bilgram Bevel Gear Generator.
#1 Adams Gear Hobbers.
#1 Schuchart & Schutte Gear Hobber.
#3 Adams Farwell Gear Hobber.
#61 Fellows Gear Shaper, Cone drive.

PLANERS

96" x 96" x 36' Cincinnati 4 Hds. M.D.
48" x 60" x 26' American 4 Heads.
30"x30"x8' Gray Planer.

CINCINNATI MACHINERY & SUPPLY CO.
217 East Second St., Cincinnati, Ohio

In Stock
THE MACHINES OF THE MONTH
Prompt Delivery

1—4 spindle, H. & W. B.B. Drill.
1—3½" Western Radial Drill, 1941.
1—O. S. Walker 6"x18" Surface Grinder, Power Feed, arranged for M.D. with Chuck.
1—Norton Cam Grinder.
1—Brown & Sharpe No. 11 Self-Contained Grinder, M. D., Centre Grinding Attachments, Steady Rests.
1—Rivett No. 505 Precision Lathe, 1" capy., Self-Contained on Factory Bench, Factory M.D., Late Model.
2—Hendey Lathes, 18"x10', Geared Head (1 with Taper).
1—Prentice Bros. Lathe, 24"x18', Geared Head, Q.C.G.
1—New K & T Univ. Milling Head for No. 3K or 3 KM, Plain or Univ.
1—Peerless Shaping Saw, 6x6, Arr. for M.D.
1—Cleveland ⅜-⅞ Auto. Screw Machine, Turner Motor Drive.
1—W & S No. 2 Hand Screw Machine, M.D., Timken Bearings.
2—3-Spindle Acme Threaders, 1", one machine lead screw.
1—New Dewalt 1½" Solid Abrasive Cut-off Machine.
1—P & W. Sgle. Spindle Gear Driven Profiler.
New and Used Chucks—All Sizes.

Have You Any SURPLUS EQUIPMENT To Sell?

UNITED MACHINERY & TOOL CORP.
442 Pleasant St., Worcester 2, Mass.

#25 Foote-Burt Drill Press, #5 taper.
8" Arter Rotary Surface Grinder.
#4 Cincinnati Vertical Miller.
#0-8 Cincinnati Vertical Millers. Motorized. Year 1941.
18" Cincinnati Plain Mig. Miller. Motorized. Year 1941.
Lincoln Type Millers—Pratt & Whitney, Hendey and Putnam.
4" Stevens Vertical Slotters. Year 1941.
#2 American Plain Milling Machine, motorized. Year 1943.

THE ELYRIA BELTING & MACHINERY CO.
Elyria Ohio

No. 2G Brown & Sharpe Automatic, M.D.
Gridley Model H, 4-spindle Chucking Machines, M.D.

MONA MEMBER

D. E. DONY MACHINERY CO.
47 Laurelton Road, Rochester 9, N.Y.

DRILL—RADIAL—FOSDICK 3¼', G.B., M.D.
KEYSEATER—MITTS & MERRILL No. 6, M.D.
MILLER, PLAIN—MILWAUKEE No. 2-B, Double Over-Arm, M.D.
PLANER, METAL—WOODWARD & POWELL 30"x30"x8', 1 rail head, 1 side head.
SAW, METAL CUTTING BAND—Marvel No. 8, cap. 18"x18".
Available Immediately—Also Many Other Tools

ALEX ZEEVE & COMPANY
2269 Woolworth Bldg. New York 7, N. Y.

AUTOMATICS

2—4 sp. Model M Cleveland, M.D.
1—#2 B. & S. Automatic
1—#00 B. & S. Automatic
1—#0 B. & S. Automatic

GRINDERS

1—#75 Heald, clutch in head
1—#72 Heald, hyd. internal, M.D.
1—#13 B. & S. Universal, M.D.
1—Both Universal, counter shaft drive
1—1¼" Oliver Drill Grinder, M.D.

LATHES

2—1"x18" Pratt and Whitney Automatic
1—8" Sunstrand Stub Lathe, M.D.
2—8" Sunstrand Full Automatic

DRILLS

4—6 spindle Allen 8" High Speed #2—Morse Taper
4—3 spindle Allen 8" High Speed #2—Morse Taper

MILLS

1—#2 Kearney & Trecker Double Overarm, M.D.
1—#2 Rockford Universal Cone Drive

SHAPERS

21" Smith & Mills, M.D. (Late Type)
24" Gould & Eberhart (Schulte, M.D.)

MISCELLANEOUS

Jones & Lamson Comparator
#7 Long & Allstatter Sprue Cutter
24"x24"x6' Ohio Planer arranged for M.D.

MILLS MACHINERY SALES
3126 GRAND RIVER DETROIT, MICH.

NEW—USED
MACHINERY
and EQUIPMENT
LARGE STOCK ON HAND

Hasco MACHINERY COMPANY
661-671 FRELINGHUYSEN AVE.
NEWARK 5, N. J. BIGELOW 3-3486-78

96"x60"x12' LIBERTY Openside Planer—2 heads on rail one side—extra housing—outer table support—table 48"x12' D.C. reversing motor drive synchronous motor—Generator Set—Class 2—11 yrs. old—Cost $35,000—our price $16,500—ceiling $24,000.
105" Betts Vertical Boring Mill, Two Swivel Heads, Arranged for Motor Drive, table 96"x8½". 57" Clearance under rail. Can show running—For quick sale $1750.

H. J. KOONTZ, MASSILLON, OHIO, Ph. 8180

REYNOLDS
BETTER USED MACHINERY

1—10"x36" Norton Hydraulic Surface Grinder, 7½ HP Motor Drive, Magnetic Chuck 10"x36". New 1941

1—36" W x 24" H x 10' Ingersoll Planer Type Miller 4 heads; adjustable rail, motor drive

1—6"x80" Pratt & Whitney Thread Miller

1—#12 M Morey 2-spindle Vertical Profiler, M. D.; New 1941

1—#34 Abrasive Vertical Spindle Surface Grinder; 24"x8"x12" h. New September 1943

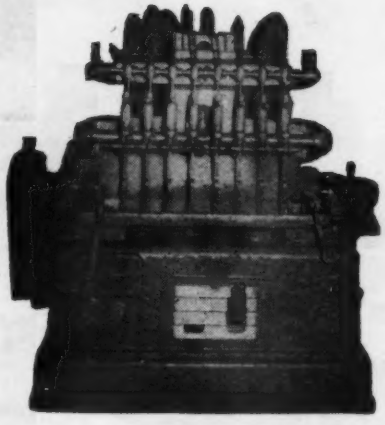
1—#10 Brown & Sharpe Plain Miller; Motor Driven; Electric Control Type; New about 1941

1—4-Spindle Delta 17" Drill; power feed to spindles, ¾ HP 220-3-60 Motor each spindle. New late 1943

1—#16 Blanchard Vertical Spindle Rotary Surface Grinder—30" magnetic chuck, 25 H.P. Motor, 220-3-60 on spindle.

REYNOLDS MACHINERY CO.
210 Eddy St., Providence 3, R. I.

SCHRANER Crankshaft LAPPER



Maximum Swing 8".

Maximum distance between centers 41".

Minimum distance between any two arms 4⅛".

Maximum distance between outer arms 41".

Arranged for motor drive in the base with motor.

This machine is now equipped with 8 arms. By increasing or decreasing the number of arms, many types of crankshafts, camshafts or straight shafts may be precision tapped.

Available for inspection at our Chicago warehouse

EMERMAN MACHINERY CORP.
875 West 120th Street — Chicago 43, Ill.

McDONALD
USED MACHINERY

Rockford 24" Shaper, S.P.D. gear box.
Cleveland O.S. Planer 36"x8', 2 hds.
American 4' Radial Drill, encl. hd.
Cincinnati D.H. Planer 36"x36"x10', 2 hds.
Barnes geared Camelback Drill Press, 4 sp.
Bullard Vert. Turret Lathes, 24" & 36" S. Head
N.-B.-P. 84" Vert. Boring Mill, m.d. 2 hds.
Cleveland Horiz. Boring Mill, m.d. 2½" bar.
American 24" x 12' grd. hd. Lathe, m.d. q.c.g.
Amer. 4-ton vert. Hydr. Broach.
Blanchard Vert. Surf. Grinder, 26 rd. mag. chuck.
Diamond Horiz. Surf. Grinder, 12"x60" Table, m.d.
Cincinnati 1-M grd. hd., Univ. tool room Miller.
Cincinnati No. 5 H.P. grd. hd. S.P.D. Pl. Miller.
Milwaukee No. 3-B Vert. Miller grd. hd., m.d.
Cincinnati 48" Auto. Pl. Prod. Miller, S.P.D.
W.&S. No. 2-A grd. hd. Univ. Turret Lathe, S.P.D.
Foster No. 2F Fastermatic grd. hd. Turret Lathe, M.D.

MONA MEMBER

McDONALD MACHINERY CO.
1531-35 N. B'way. St. Louis 6, Mo.

AIR HYDRAULIC PRESSES: (New) 5000 lbs. 2"-5" Stroke
AUTOMATIC: Brown & Sharpe #2G H.Speed with slotter
AUTOMATIC: (6) Davenports, 5 Sp. 9/16" Cap. Models B & DA
AUTOMATIC: (2) Gridley Single Sp. 3¼", 4¼" Cap.
BORING MILL: Horizontal, Gisholt 4"
DRILL PRESS: Barnes No. 263 Slid. Hd. No. 5 Morse
GRINDER: Bryant No. 16, 16" Chucking (1943)
GRINDER: Centerless Zephyr No. 2 (NEW)
GRINDER: Red Head "Heald" New, 1,500 RPM
GRINDER: Internal-Sav-Way 9"x18" (1944)
GRINDER: Thread—Excello No. 31, 1943
GRINDER: Surface B & S #2 Mag. chuck
GRINDER: Double End, Norton, Model D
IRON WORKER: No. 20 Pels and Angle Shear 6"x6"x½"
LATHE: Adams Short Cut Geared Head 14"x4'
LATHE: Seneca Falls 12"x5'
LATHE: Speed, Sloan & Chase, collets, Bench type
MILLER: Plain Horiz. No. 3 LeBlond, Vert. Att.
MILLER: Plain Horiz. (No. 1) No. 26 Becker Brainard
MILLER: Milwaukee No. 2 Universal Q.C.
MILLER: Pl. Horiz. Cinc. No. 2M, Rect. Arm
PIPE: Cut-off 3" Hurlbert-Rogers
PIPE: Portable Threader & Cutoff 2" cap.
POWER PRESS: All sizes
POWER PRESS: Ferracute—60 ton Coining & Embossing
COMB. PUNCH & SHEAR: Pels No. 20
PRESSES: Air Hydraulic (New)
RIVETER: Counter Sinker Farnham, hyd. (1944) 36" Reach
RADIAL DRILL: Carlton 3'
SAWS: Band, Kalamazoo, Metal (NEW) 8"x16"
SHEAR: Beam Pelz T-36 H.D.
SQ. SHEAR: Niagara 12'x14 gauge
SLOTTER: Vert. Bement Niles 12"
SHAPER: Niles Bement 20" back geared
THREADERS: Landmaces 4" Single, 2" Double Head, 1943
THREAD MILLER: Plan-O-Mill 8" Int, Ext. x 31" long (1943)
TURRET: B & O 3½" collets Univ.
TURRETS: Simmons Micro-Speed 1¼" Cap. (1943)
TURRETS: (2) Midlands #5 Universal (1943)
(100) TOOL CHESTS: (New) Portable, Steel 34"x17"x12" many draws and compartments @ 36 each
WELDERS: Spot, Larkin 20 & 30 KVA (new) no priority

Phones: TRiangle 5-5212-5237

MONA MEMBER

KINGS COUNTY MACHINERY EXCHANGE
[illegible] Brooklyn 2, N. Y.

LARGE LATHES

30"x26' Lodge & Shipley 12 speed Geared Head, M.D.
32"x35' Wickes Grd. Hd., M.D.
36"x30' Putnam Grd. Hd., M.D.
42"x16' Putnam, M.D.
36"x22' Putnam Geared D.C. M.D.

AARON MACHINERY CO.
45 CROSBY STREET NEW YORK, N.Y.

BORING MILLS

60" Niles, 2-swivel heads, M.D.

42" Gisholt, 1-swivel and 1-turret head, Motor 3/60.

36" Colburn, single turret head, for M.D. (modern)

24" Bullard "New Era" with side head, Motor 3/60/220 Volts. Rebuilt 1942.

GALBREATH MACHINERY CO.
Empire Building Pittsburgh 22, Pa.

4-speed A. C. Motors

14—New 15 H.P. Westinghouse Constant Horsepower, 600 / 900 / 1200 / 1800 R.P.M. Frame 445. Ball Bearing, with Thermo guards. 3 ph., 60 cy., 440 volts.

11—New Allen-Bradley Bulletin 715 size; 2—4-speed across the line magnetic switches, with master drum, for use with above.

New York City's largest stock of Electrical Machinery

ONE YEAR GUARANTEE

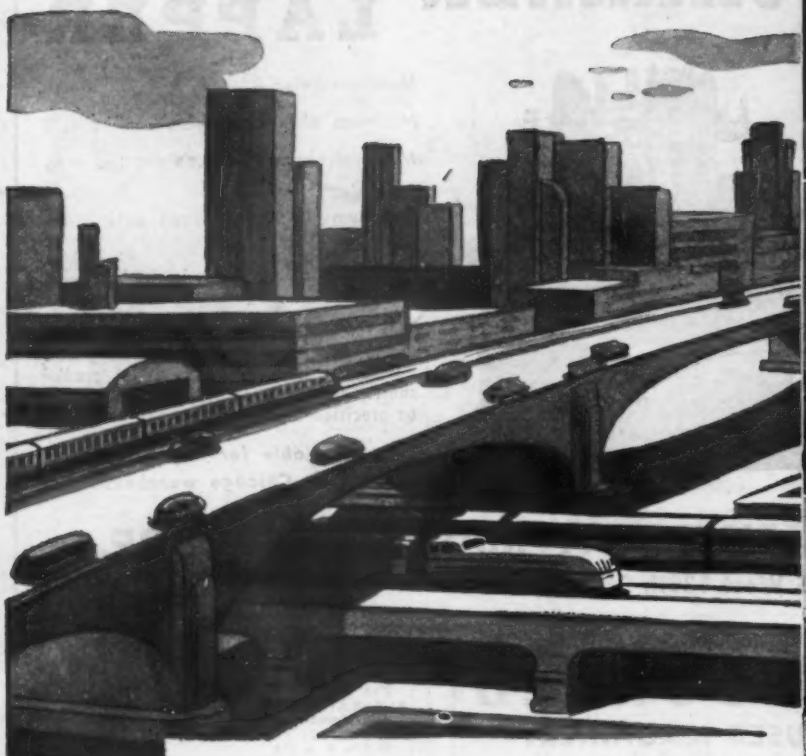
L. J. LAND and COMPANY
Established 1910
146 Grand St. New York 13, N. Y.
We are actively in the market to purchase your surplus or idle electrical machinery

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT - GUARANTEED

MONA MEMBER

JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.



On the MAIN ROAD of Industry

The steadily increasing demand for Allied's precision workmanship from the very beginning has fostered the enlargement of its working area from 5000 square feet in one plant in 1915, to 275,000 square feet in four great plants today. This growth over a period of 30 years . . . steady and consistent . . . places Allied solidly on the main road of industry . . . establishes Allied as a standard source of precision tools and parts *in great quantity* for automotive, radio, home appliance, plastics, aviation, furniture, electrical, farm implement and many other mass production manufacturers. Send in *your* blueprints . . . or write to Allied, now.

BUY WAR BONDS

★ ★ ★

"IT'S AN ALLIED PRODUCT." In its four plants shown above—two in Detroit and two in Hillsdale, Michigan—Allied makes special cold forged parts, cap screws, etc.; hardened and precision ground parts; sheet metal dies (from the largest to the smallest); R-B Interchangeable Punches and Dies; jigs, fixtures, steam-heated plastic molds and special production tools.

ALLIED PRODUCTS CORPORATION

Department 26
4612 Lawton Avenue
Detroit 8, Michigan

ADVER'.

	Page
Abrasive Machine Tool Co.	282
Ace Manufacturing Corp.	218
Acme Machine Tool Co.	44
Adams Co.	220
Aeronautical Products, Inc.	209
Allied Products Corp.	358
Allis-Chalmers Manufacturing Co.	17, 32
Almond Mfg. Co., T. R.	300
Aluminum Co. of America	91
American Brass Co.	189, 190
American Chain & Cable Co., Inc.	268
American Cutter & Engineering Corp.	308
American Foundry Equipment Co.	292
American Magnesium Corp.	76
American Screw Co.	172
American Tool Works Co.	20, 21
Ames Co., B. C.	254
Ampco Twist Drill Co.	140
Apex Machine & Tool Co.	309
Armstrong-Blum Manufacturing Co.	86
Armstrong Brothers Tool Co.	94
Atlantic Gear Works	222
Atlantic Screw Works	172
Automotive Gear Works, Inc.	225
Avey Drilling Machine Co.	273
Axelson Manufacturing Co.	253
Bakelite Corp.	170
Baker Brothers, Inc.	269
Baldwin Southwark Div. Baldwin Locomotive Works	239
Bantam Bearings Div. Torrington Co.	213
Barber-Colman Co.	59
Barnes Drill Co.	252
Barrett Co., Leon J.	314
Baumbach Manufacturing Co., E. A.	238
Bearings Co. of America	217
Beaver Gear Works, Inc.	224
Bethlehem Steel Co.	232
Bijur Lubricating Corp.	167
Bilgram Gear & Machine Works	230
Black & Decker Manufacturing Co.	176, 177
Blake Co., Edward	294
Blanchard Machine Co.	36
Blank & Buxton Machinery Co.	218
Boyar-Schultz Corp.	244
Brad Foote Gear Works	229
Braun Gear Co.	230
Breuer Electric Manufacturing Co.	316
Briggs Mfg. Co.	340
Bristol Co.	172
Brown & Sharpe Mfg. Co.	63, 216
Bryant Chucking Grinder Co.	79
Bryant Machinery & Engineering Co.	255
Buffalo Bolt Co.	185
Buffalo Forge Co.	284
Bullard Co.	52
Burke Machine Tool Co.	258
Butterfield Div. Union Twist Drill Co.	51
Cadillac Gage Co.	149
Campbell Division, Andrew C. Amer. Chain & Cable Co., Inc.	268
Carboloy Co.	165
Carborundum Co.	311
Card Manufacturing Co., S. W.	50
Carlton Machine Tool Co.	270
Carpenter Steel Co.	68, 69
Central Screw Co.	172
Chandler Products Corp.	172
Century Electric Co.	207
Chicago Screw Co.	212
Chicago Tool & Engineering Co.	334
Chicago Wheel & Mfg. Co.	166
Chisholm-Moore Hoist Corp.	178
Cincinnati Bickford Tool Co.	95
Cincinnati Electrical Tool Co.	314
Cincinnati Gear Co.	222
Cincinnati Grinders, Incorporated	10, 11
Cincinnati M	
Cincinnati Pla	
Clark Co., Robe	
Clearing Machine	
Cleereman Machine	
Clemson Brothers, Inc.	
Cleveland Automatic Mac	
Cleveland Crane & Enginee	
Cleveland Hobbing Machine	
Cleveland Pneumatic Tool Co.	
Cleveland Punch & Shear Wor	
Cleveland Tapping Machine Co.	
Cleveland Twist Drill Co.	
Clover Mfg. Co.	
Columbus Die-Tool & Machine Co.	
Columbia Tool Steel Co.	
Columbus-McKinnon Chain Corp.	178
Comtor Co.	230
Cone Automatic Machine Co.	
Continental Screw Co.	174
Continental Tool Works, Div. of Excello Corp.	75
Corbin Screw Corp.	172, 191
Coulter Machine Co., James	270
Crafts Co., Inc., Arthur A.	322
Criterion Machine Works	286
Cullen-Friestedt Co.	338
Danly Machine Specialties, Inc.	196
Davis & Thompson Co.	262, 320
Davis Keyseater Co.	300
Dayton Rogers Mfg. Co.	310
Dayton Rubber Mfg. Co.	195
Dearborn Gage Co.	158
Dearborn, Inc., Howard	344
Denison Engineering Co.	233
DeSanno & Son, Inc., A. P.	299
Desmond-Stephan Mfg. Co.	300
Detroit Broach Co.	285
Detroit Die Set Corp.	238
Detroit Tap & Tool Co.	147
DeVlieg Machine Co.	54
Diamond Tool Co.	316
Driver-Harris Co.	179
Durez Plastics & Chemicals, Inc.	241
Dzus Fastener Co., Inc.	203
Eastern Machine Screw Corp.	324
Elastic Stop Nut Corp.	187
Elmes Engineering Works	237
Entwistle Co., James L.	178
Errington Mechanical Laboratory	312
Etna Machine Co.	235
Ettco Tool Co.	298
Excello Corp.	28, 29
Federal Bearings Co., Inc.	181
Federal Machine & Welder Co.	330, 331
Federal Telephone & Radio Corp.	265
Fellows Gear Shaper Co.	8, 9
Fenn Mfg. Co.	334
Fitchburg Grinding Machine Corp.	62
Foote Bros. Gear & Machine Co.	228
Fosdick Machine Tool Co.	72
Fuller Brush Co.	230
Gallmeyer & Livingston Co.	286
Ganschow Gear Co.	230
Gear Specialties Mfrs.	224
General Die & Stamping Co.	310
General Electric Co.	43, 55, 58, 93
General Machinery Corp.	40
General Screw Mfg. Co.	172
Geometric Tool Co.	324
Gerotor-May Corp. (Logansport, Ind.)	186
Giddings & Lewis Machine Tool Co.	84, 85
Gisholt Machine Co.	41, 53
Gits Brothers Mfg. Co.	214
Gleason Works	3
Gorton Machine Co., George	257
Goss & deLeeuw Machine Co.	274
	64
y Co.	224, 310
	2nd Cover
Henry ... Mfg. Co.	342
Hill Acme Co.	92
Hobart Brothers	322
Hoefer Mfg. Co.	262
Holman Reamer Co.	322
Hones, Inc., Charles A.	336
Howell Electric Motors Co.	215
Hyatt Bearings Division, General Motors Corp.	210
Hydraulic Press Mfg. Co.	77
Illinois Tool Works	281
Industrial Steels, Inc.	219
International Detrola Corp., Foster Division	289
International Nickel Co., Inc.	183
International Screw Co.	172
International Telephone & Telegraph Corp.	265
J & S Tool Co.	318
Johnson Machine Co., Carlyle	216
Johnson Tool Co.	318
Jones & Lamson Machine Co.	6, 7
Jones & Laughlin Steel Corp.	88
Kaufman Manufacturing Co.	260
Kearney & Trecker Corp.	37
Keller Tool Co.	334
Kelley Gear & Tool Co.	226
Kennametal, Inc.	74
Kent-Owens Machine Co.	263
Kingsbury Machine Tool Co.	82
Knight Machinery Co., W. B.	268
Kobe, Incorporated	60
Laminated Shim Co., Inc.	168
Lamson & Sessions Co.	172, 204, 205
Landis Machine Co.	14, 15
Landis Tool Co.	18, 19
Larco Diamond Tool Co.	300
Latrobe Electric Steel Co.	277
Lavalle & Ide	312
Lawson Machine & Tool Co.	343
Leach Machinery Co., H.	294
LeBlond Machine Tool Co., R. K.	71
Lehmann Machine Co.	245
Leland-Gifford Co.	243
Lempco Products Corp.	73
Liberty Planers, Inc.	276
Lincoln Electric Co.	46, 47
Linley Brothers Co.	274
Littell Machine Co., F. J.	336
Lodge & Shipley Machine Tool Co.	143
Lord Manufacturing Co.	193
Lovejoy Tool Co., Inc.	315
Lowenstein, Alex.	212
Lucas Machine Tool Co.	270
Luers, J. Milton	322
Lufkin Rule Company	163
Lynn Mfg. Co.	318

NDEX

Page

... 319
... 192
... 276
... 30
... 308
... 172
... 249
... 242
... 172
... 159
...o., Inc. 248
Mfg. Co., Inc. 320
...oundry Co. 322
..., Inc. 223
...Co. 308
... & Steel Co. 296
Worden White Co. 39
...r Refining Co. 278
...er Chuck Co. 321
... Products 326
Monarch Machine Tool Co. 24, 25
Moore Special Tool Co. 171
Morey Machinery Co., Inc. 254
Morris Machine Tool Co. 98
Morse Chain Co. 194
Morse Twist Drill & Machine Co. 288
Murray Mfg. Co., D. J. 294

National Acme Co. 61
National Machine Tool Co. 320
National Screw & Mfg. Co. 172
Newark Gear Cutting Machine Co. 224
New Britain-Gridley Machine Division, New Britain Machine Co. 3rd Cover
New England Screw Co. 172
Nicholson & Co., W. H. 326
Nicholson File Co. 175
Nichols & Sons, W. H. 169
Norgren Co., C. A. 199
Norton Company 22, 23, 66

Oakite Products, Inc. 240
Ohio Crankshaft Co. 173
Oliver Instrument Co. 268
Oster Manufacturing Co. 246

Parker-Kalon Corp. 172, 198
Pawtucket Screw Co. 172
Peerless Machine Co. 260
Perkins Machine & Gear Co. 227
Pheoll Manufacturing Co. 172
Philadelphia Gear Works, Inc. 221
Phillips Screw Manufacturers 172
Plan-O-Mill Corp. 251
Portage Machinery Co. 266
Potter & Johnston Machine Co. 42
Pratt & Whitney Div., Niles-Bement-Pond Co. 90
Pressed Metal Institute 339
Process Gear Company 226
Production Machine Co. 266

Quaker City Gear Works, Inc. 222
Quality Tool & Die Co. 280
Queen City Machine Tool Co. 266

Randall & Stickney 326
Reading Screw Co. 172
Ready Tool Co. 302
Reed-Prentice Corp. 270
Reeves Pulley Co. 202
Revere Copper & Brass, Inc. 157
Rickert Shafer Co. 332
Rieger Manufacturing Co. 320
Rivett Lathe & Grinder, Inc. 83
Roberts Rubber Co., Weldon 267
Robertson Mfg. Co. 317
Rockford Machine Tool Co. 250
Russell Burdsall & Ward Bolt & Nut Co. 172
Ruthman Machinery Co. 212
Ryerson & Sons, Inc., Joseph T. 160

Smallpiece Ltd. 216
Smith & Mills Co. 270
Snyder Tool & Engineering Co. 34
Socony-Vacuum Oil Co., Inc. 261
South Bend Lathe Works 38
Southington Hardware Mfg. Co. 172
Spencer Thermostat Co. 208
Split-Ball Bearing Corp. 344
Springfield Machine Tool Co. 262
Standard Gage Co., Inc. 87
Standard Pressed Steel Co. 335
Standard Thread Gage Co. 326
Standard Tool Co. 303, 304
Steel Company of Canada, Ltd. 172
Steelweld Machinery Div. Cleveland Crane & Engineering Co. 234
Steinle Machine Co. 78
Stuart Oil Co., Ltd., D. A. 324
Sturgis Products Co. 206
Sundstrand Machine Tool Co. 279
Sun Oil Company 161
Super Tool Co. 323

Tannewitz Works 268
Threadwell Tap & Die Co. 283
Timken Roller Bearing Co. 48
(Steel & Tube Div.) 4th Cover
Titeflex, Inc. 200
Tolhurst Centrifugal Div. Amer. Mach. & Metals, Inc. 333
Tomkins-Johnson Co. 236
Tool Improvements Co. 324
Torit Mfg. Co. 336
Torrington Co. 155, 238
Torrington Co., Bantam Bearings Division 213
Tungsten Electric Co. 325
Turner Gauge Grinding Co. 164
Turner Uni-Drive Company (Sales Div.: Turner Machinery Co.) 201

Udylite Co. 329
Union Carbide & Carbon Corp. 170
Union Twist Drill Co. 49
United Chromium, Inc. 327
U. S. Drill Head Co. 316
Universal Boring Machine Co. 262
Universal Engineering Co. (Calif.) 286
Universal Engineering Co. (Mich.) 275

V & O Press Co. 238
Vanadium-Alloys Steel Co. 293
Van Keuren Co. 65
Van Norman Co. 12, 13
Van Tuyl Engineering Corp. 244
Vascaloy-Ramet Corp. 301
Veeder-Root, Inc. 211
Vickers, Inc. 162
Victor Machinery Exchange, Inc. 306
Vinco Corporation 256

Page

Wade Tool Co. 297
Walker-Turner Co. 259
Walker Co., Inc., O. S. 302
Wall-Colmonoy Corp. 287
Waltham Machine Works 276
Warner & Swasey Co. 96
Warren Refining & Chemical Co. 337
Webber Gage Co. 138
Weldon Tool Co. 306
Wesley Steel Treating Co. 328
Westinghouse Electric Corp. 16, 56, 57, 89
Wheel Trueing Tool Co. 307
Wickman Corp. 264
Williams & Co., J. H. 271
Wilson Machine Products Co. 145
Wilson Mechanical Instrument Co. 322
Winter Brothers Co. 305
Wolverine Bolt Co. 172
Wyckoff Steel Co. 182

Zeh & Hahnemann Co. 238

Classified Advertising
SEARCHLIGHT SECTION

Classification — Page

BUSINESS OPPORTUNITIES ... 350
CONTRACT WORK SECTION ... 345
Bridgewater Screw Products Co. ... 345
Covington Electrical Mechanical Co. ... 345
Eastern Tool & Mfg. Co. ... 345
General Pattern Works ... 345
Greist Mfg. Co. ... 345
J. & S. Tool Co. ... 345
M & N Machine & Tool Works ... 345
Nilson Machine Co., A. M. ... 345
Production Tool Co. ... 345
South Shore Machine & Tool Works ... 345
Specialty Machine Tool & Die Co. ... 345
Thomas & Skinner Steel Products Co. ... 345
Vahl Engineering Co. ... 345
EMPLOYMENT SERVICE ... 346
PATENT ATTORNEY ... 348
POSITIONS VACANT ... 345, 346, 347
POSITIONS WANTED ... 346, 348
PROFESSIONAL SERVICES ... 348
REBUILDING SERVICE ... 346, 347, 355
Hill-Clarke Machy. Co. ... 355
Lucas & Son, Inc., J. L. ... 346
Simmons Machine Tool Corp. ... 347
SELLING OPPORTUNITIES ... 348
WANTED TO PURCHASE ... 350
USED EQUIPMENT ... 350-357
Aaron Machinery Co. ... 352, 354, 355, 357
Botwinik Bros., Inc. ... 354
Brooks, B. D. ... 350
Brownell, Hazard ... 352
City Machine Co. ... 350
Cleereman Machine Tool Co. ... 350
Cincinnati Machinery & Supply Co. ... 356
Dayton Rogers Mfg. Co. ... 350
DeWitt Tool Co. ... 350
Denmark Machine Co. ... 350
Dony Machinery Co., D. E. ... 356
Eastern Machinery Co. ... 351
Elyria Belting & Machinery Co. ... 356
Emerman Machinery Corp. ... 357
Falk Machinery Co. ... 349
Galbreath Machinery Co. ... 357
Giardino, M. D. ... 350
Hasco Machinery Co. ... 356
Hill-Clarke Machinery Co. ... 355
Hyman & Son, Joseph ... 357
Iron & Steel Products, Inc. ... 355
Kings County Machinery Exchange ... 357
Koontz, H. J. ... 350, 356
Land & Co., L. J. ... 357
Laurens Bros. ... 356
Lucas & Son, Inc., J. L. ... 346
Marks Machine Tool Corp. ... 354
McDonald Machinery Co. ... 357
Miles Machinery Co., Inc. ... 352
Mills Machinery Sales ... 356
Morey Machinery Co., Inc. ... 352
Osborne & Sexton Machinery Co. ... 356
Ott Machinery Sales, Inc. ... 355
Paul's Motor & Machy. Supply ... 356
Reynolds Machinery Co. ... 357
Simmons Machine Tool Corp. ... 347
S & S Machinery Co. ... 353
Strong, Carlisle & Hammond Co. ... 354
United Machinery & Tool Corp. ... 356
Universal Hydraulic Machy. Co. ... 350
Virjune Machine Co. ... 350
West Penn Machinery Co. ... 355
Zeeve & Co., Alex. ... 356

Page
297
259
302
287
276
96
337
138
306
328
57, 89
307
264
271
145
322
305
172
182
238

Page
350
345
345
345
345
345
345
345
345
345
345
345
345
345
346
348
346, 347
346, 348
348
347, 355
355
346
347
348
350
350-357
355, 357
354
350
352
350
356
350
350
350
356
351
356
357
349
357
350
356
355
357
355
357
350, 356
357
356
346
354
357
352
356
352
356
355
356
357
347
353
354
356
350
350
355
356

NIST

THE

TURNING QUESTIONS *Answered!*

WHY A QUICK CHANGE FEED BOX?

Because it greatly speeds and simplifies the selection of feeds and thread cutting ratios. When coupled to the splined feed rod, 54 to 63 definite feeds can be transmitted to the longitudinal movement of the carriage, or the cross movement of the tool slide. When coupled to the lead screw, the same number of definite threads can be cut. Two hand-operated handles control the multiplicity of its combinations. This precision made Quick Change Feed Box is another of the many LeBlond features . . . another reason why men of machine tool "know-how" specify LeBlond Lathes.

★

SINCE 1887

the world has been turning to LeBlond for turning equipment.

★

WRITE FOR CATALOG!

AT YOUR SERVICE

LeBlond field engineers are prepared to help you in your development work, particularly along the lines of the difficult, the "out-of-the-ordinary" turning problems. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war—gained over a period of nearly 60 years from thousands of installations all over the world is yours for the asking. Contact our nearest dealer or write Department FE46.

THE R. K. **Le BLOND**

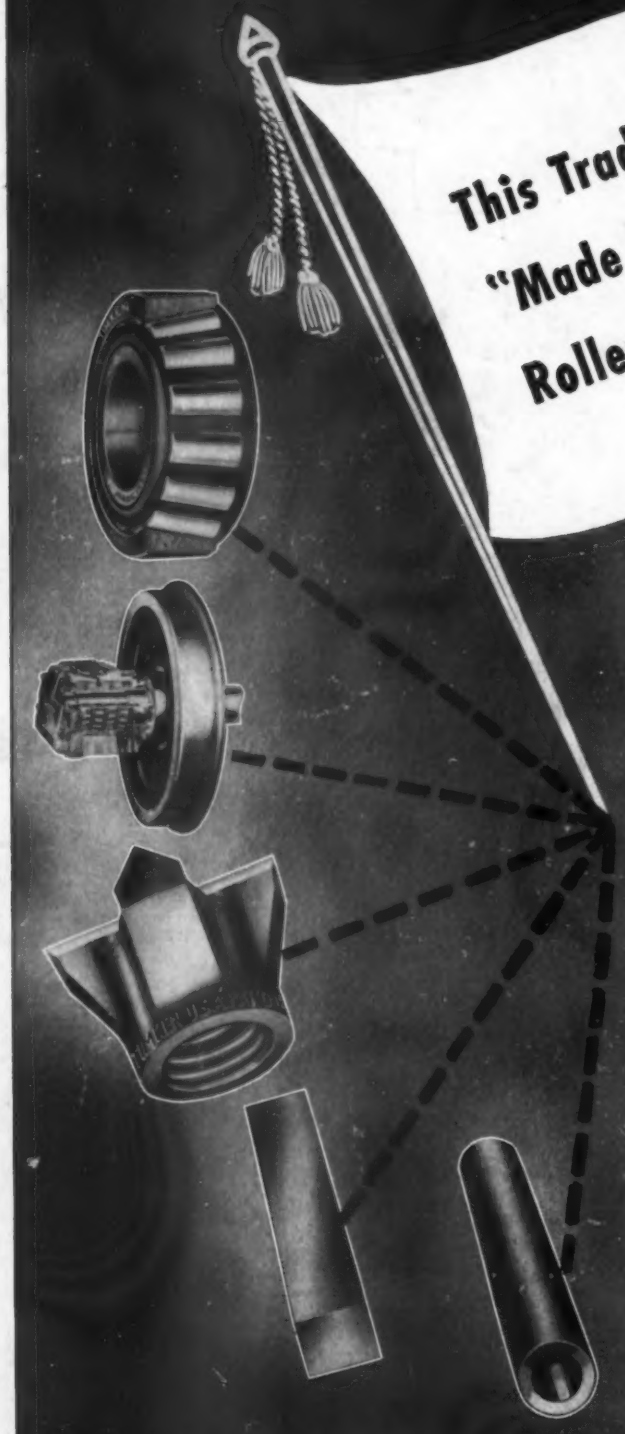
★ YOUR BONDS BUY BOMBS ★
BUY A "BLOCK-BUSTER" TODAY!

MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.

NEW YORK 6, Singer Bldg., 149 Broadway, WOrth 2-0722
CHICAGO 6, 20 North Wacker Drive, STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

. PAT. OFF.



This Trade-Mark Means "Made By The Timken Roller Bearing Company"

Wherever you find it—on tapered roller bearings; alloy steel; seamless steel tubing; or rock drilling bits; it identifies a *genuine* Timken product with all that this implies—superior quality, performance and endurance.

These inherent advantages are not visible; they are revealed only in service, but you can be sure of getting them in full by making sure that the trade-mark "TIMKEN" is on every tapered roller bearing, every bar of alloy steel, every seamless steel tube and every rock bit you buy.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO